

RD-R143 438

AN EVALUATION OF TWO RELIABILITY AND MAINTAINABILITY
INFORMATION SYSTEMS(U) AIR FORCE INST OF TECH
WRIGHT-PATTERSON AFB OH SCHOOL OF SYSTEMS AND LOGISTICS

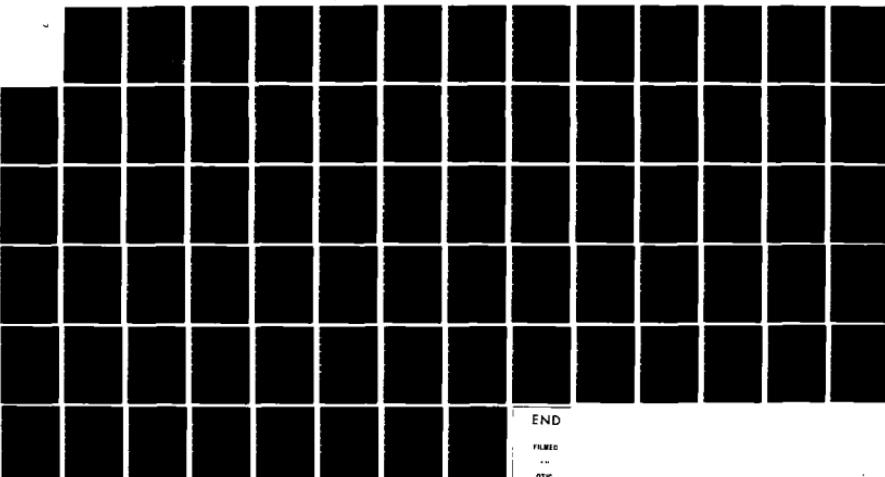
1/1

UNCLASSIFIED

L K BOCK JAN 84 AFITLSSR-66-83

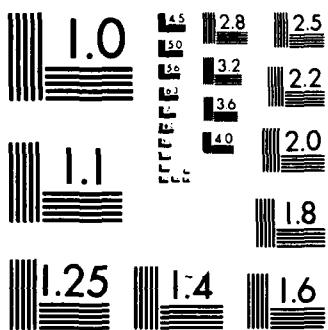
F/G 9/2

NL



END

FILMED
IN
OTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

DTIC FILE COPY

AD-A143 438



1

AN EVALUATION OF TWO RELIABILITY AND
MAINTAINABILITY INFORMATION SYSTEMS

Larry K. Bock, Captain, USAF

LSSR-66-83

DTIC
ELECTE
JUL 23 1984
S D
B

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

DISTRIBUTION STATEMENT A

Approved for public release
Distribution Unlimited

24 07 18 023

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE			READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2 GOVT ACCESSION NO	3. RECIPIENT'S CATALOG NUMBER	
LSSR 66-83			
4. TITLE (and Subtitle) An Evaluation of Two Reliability and Maintainability Information Systems	5. TYPE OF REPORT & PERIOD COVERED Master's Thesis		
7. AUTHOR(s) Larry K. Bock, Captain, USAF	8. CONTRACT OR GRANT NUMBER(s)		
9. PERFORMING ORGANIZATION NAME AND ADDRESS School of Systems and Logistics Air Force Institute of Technology, WPAFB OH	10. PROGRAM ELEMENT PROJECT, TASK AREA & WORK UNIT NUMBERS		
11. CONTROLLING OFFICE NAME AND ADDRESS Department of Communication AFIT/LSH, WPAFB OH 45433	12. REPORT DATE January 1984		
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	13. NUMBER OF PAGES 71		
15. SECURITY CLASS. (of this report) Unclassified			
16. DECLASSIFICATION DOWNGRADING SCHEDULE			
17. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited			
18. SUPPLEMENTARY NOTES <i>Lynn Wolan</i> <i>24 Feb 1984</i>			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Data Bases Data Storage Systems Information Processing Maintenance Management Maintainability			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Thesis Chairman: Ronald G. Blackledge, Lt Col, USAF			

Air Force managers require adequate and timely information in order to make effective decisions regarding reliability and maintainability (RAM) issues. Since 1980, at least two Air Force organizations have contracted for additional computer data base systems to improve their RAM data requirements. These data base systems provide real-time maintenance and operational data on certain weapons systems. This study analyzed the output characteristics of these new data base systems to determine if they did provide improved information and comparison with the standard Air Force maintenance and operational data reports. It was shown that the two new data base systems did provide more timely RAM data which resulted in information that allowed effective and efficient management decisions making. However, all the timely information available for managerial decisions will be hindered until data input errors are reduced.

The contents of the document are technically accurate, and no sensitive items, detrimental ideas, or deleterious information are contained therein. Furthermore, the views expressed in the document are those of the author(s) and do not necessarily reflect the views of the School of Systems and Logistics, the Air University, the United States Air Force, or the Department of Defense.

LSSR 66-83

AN EVALUATION OF TWO RELIABILITY AND
MAINTAINABILITY INFORMATION SYSTEMS

A Thesis

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University

In Partial Fulfillment of the Requirement for the
Degree of Master of Science in Logistics Management

By

Larry K. Bock, B.S.
Captain, USAF

January 1984

Approved for public release;
distribution unlimited

This thesis, written by

Captain Larry K. Bock

has been accepted by the undersigned on behalf of the
faculty of the School of Systems and Logistics in partial
fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT

Date: 31 January 1984

Ronald G Blackledge
COMMITTEE CHAIRMAN

Patricia J. Breuer
COMMITTEE MEMBER

ACKNOWLEDGEMENTS

I sincerely appreciate the assistance, guidance, and patience given by my advisors, Lt Col Ronald G. Blackledge and Mr Patrick M. Bresnahan.

I am indebted to many persons for their aid during the research and writing of this thesis. I gratefully acknowledge the cooperation and assistance offered by personnel of the Strategic Systems and F-16 program offices.

The author would like to express his appreciation to his typists, Stephanie Allen and Debi Walters, for their interest and versatility in the preparation of this thesis.

Finally, I wish to express my heartfelt appreciation to my wife for her patience, support and understanding shown during the preparation of this thesis.

-Larry K. Bock

iii

Accession For	
NTIV	55X1
DTIC TAB	1
Specified	1
Classification	
Reference	
Distribution	
Availability Codes	
Dist	Avail and/or Special
A-1	

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
CHAPTER	
I. INTRODUCTION	1
Background	1
Difference Between Data and Information	5
Statement of the Problem	5
Scope	10
Objectives of the Research	10
Research Questions	11
II. LITERATURE REVIEW	12
Introduction	12
Previous Studies	12
Other Sources	14
Summary	15
III. METHODOLOGY	16
Overview of Research	16
Informational Criteria	16
Nature and Sources of Data	18
Data Analysis	19
IV. RESULTS	20
Introduction	20
Analysis	21
Numerical Analysis	30
V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS . . .	33
Summary	33
Conclusions	34
Recommendations	35

	Page
APPENDIX A: MAINTENANCE DATA COLLECTION REPORTS . . .	37
APPENDIX B: EXAMPLES OF MARCON COMPUTERIZED MAINTENANCE DATA	42
APPENDIX C: EXAMPLES OF TASC COMPUTERIZED MAINTENANCE DATA	48
SELECTED BIBLIOGRAPHY	57
A. REFERENCES CITED	58
B. RELATED SOURCES	59

LIST OF TABLES

Table	Page
1. Summary of MDC System Problems	4
2. FDTS Overview and Trend Output Products	27
3. FDTS Equipment - or Action - Specific Output Products	28
4. FDTS Detailed Information Output Products . . .	29
5. Numerical Results Matrix	32

LIST OF FIGURES

Figure	Page
1. AFLC Current Maintenance and Operations Management Information System	8
2. TASC System Flow Chart	22
3. TASC Data Process	24

CHAPTER I

INTRODUCTION

Background

In this age of high technology, the key to effective management is the ability to obtain and use vast amounts of information. The arrival of computers and modern communication capabilities has resulted in quantities of data being available at a very rapid pace. In order to properly use this enhanced management capability, the user needs to have an information system which meets his requirements at the proper time. However, a manager could be rapidly inundated with vast amounts of data, much irrelevant, which could hamper decision making as much as before. The key, then, is to be able to obtain the proper quantity and quality of data at the right time resulting in information which allows more effective decision making.

Having limited resources available in today's Air Force, the emphasis is to develop and field weapon systems which meet support and readiness requirements. To ensure these weapon systems meet such requirements, it is necessary to obtain, store, analyze and evaluate system performance in a timely manner. The Air Force accomplishes this by utilizing numerous computers and data collection methods.

The Maintenance Data Collection (MDC) system is the present management system the Air Force uses to monitor equipment/system performance. Basically, the MDC system records and reports the how, what, and when of the maintenance work performed on all aircraft, missiles, ground communications, electronics, meteorological equipment, and related end items. Maintenance action data is documented manually, collected centrally, keypunched and processed for computer storage and manipulation (2:4). Some form of optional maintenance action reporting has been ongoing since 1955. After 1958, mandatory reporting of the MDC system was required by AFM 66-1 (2:6). As a result of this mandatory reporting, the data collection effort was further changed in 1965 to the present MDC system.

Since the decision for mandatory reporting, the actual collection and reporting became a herculean effort. This led to a drop in reporting factors such as work force employment. This reduction in reporting procedures left the MDC system as it exists today. Although the Air Force has used the current MDC system since 1965, it has received constant criticism over the years. An increased emphasis on reporting the data rather than how the data could be used has been an area of criticism since the 1958 mandatory reporting went into affect. Other criticisms and problems of the MDC system are shown in Table 1.

The basic concern over the current MDC system, as for any data base system, is the users are not receiving the information they need to support managerial decision making.

In regard to MDC, it has been stated: . . . the most telling criticism is that the MDC system doesn't really provide the manager information at all, it just provides reformatted data (2:12-13).

Actually, the MDC system collects maintenance data from all Air Force bases into a computer system which aggregates that data and then produces fixed paper formatted reports. From these reports the data can be analyzed only by manual extraction, preparation and presentation to managers for facilitating any decision process. By the time these presentations are available to management, the information can be several weeks or months old.

As a result of the criticisms and problems relating to the overall usefulness and effectiveness of the MDC system and the reports generated from it, several users of the MDC system data have developed additional computer resources to assist them in their informational requirements. Presently, two system program offices (SPO) in Aeronautical Systems Division at Wright-Patterson Air Force Base have utilized additional computer resources.

Table 1. Summary of MDC System Problems (2)

	ACCURACY	RELIABILITY	ACCESSIBILITY	USABILITY	EFFICIENCY
INPUT	Data coding too complex; voluminous manual recording; personnel training inadequate; pressures for padding data.	Individual motivation lacking; data coding unclear.	Data not collected; or not available for collection; data sources unknown; collection of related data not synchronized in time; lag too great between capture and entry.	Lag too great between capture and entry.	Complex procedures; methods not appropriate to volume; outdated equipment & procedures.
	Missing or outdated decision rules.	Transmission procedures foster errors.	Hardware and software insufficient to meet needs.	Transmission procedures result in delays.	Processing too slow; too many people & steps involved.
PROCESSING					
OUTPUT	Degree and frequency of inaccuracy excessive; Inadequate control; and feedback from management on effects.	Conflicting information from different sources; accuracy of input data questionable; info not timely.	Reports not timely for decision making; turn around time on info requests too long; complex procedures for obtaining info; info from different sources not meshed.	Not in format required for subsequent action; appropriate programs are not provided; received reliability low; user acceptance poor; personnel not trained to use info.	Reports not used; inefficient communication channels; re-aggregation and summarization required; manual analyses required.

The basic concern over the current MDC system, as for any data base system, is the users are not receiving the information they need to support managerial decision making.

In regard to MDC, it has been stated: . . . the most telling criticism is that the MDC system doesn't really provide the manager information at all, it just provides reformatted data (2:12-13).

Actually, the MDC system collects maintenance data from all Air Force bases into a computer system which aggregates that data and then produces fixed paper formatted reports. From these reports the data can be analyzed only by manual extraction, preparation and presentation to managers for facilitating any decision process. By the time these presentations are available to management, the information can be several weeks or months old.

As a result of the criticisms and problems relating to the overall usefulness and effectiveness of the MDC system and the reports generated from it, several users of the MDC system data have developed additional computer resources to assist them in their informational requirements. Presently, two system program offices (SPO) in Aeronautical Systems Division at Wright-Patterson Air Force Base have utilized additional computer resources.

Difference Between Data and Information

To provide a common frame of reference, the following terms are defined as they are used in this thesis:

Data. A representation of facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing by humans or machines (5:571).

Information. (1) data that has been transformed into a meaningful and useful form for specific human beings; (2) the meaning that a human assigns to data by means of the known conventions used in their representation (5:575).

Statement of the Problem

The current emphasis in the defense establishment are support and readiness. With increased use of highly technological and expensive weapon systems, the emphasis is on the support and readiness of these systems. As stated in a DOD joint agreement in June 1983 (13):

Improvements in support and readiness are major DOD objectives in both the weapon system and support technology areas. Technical innovation is essential to improve the readiness of our systems. We agree to increase the emphasis on technology areas which can increase mission reliability, reduce dependence on support equipment, spares and repair facilities, and reduce the need for highly skilled personnel.

The key to meet the support and readiness issue is to have reliability and maintainability (R&M) in the Air Force weapon systems. Through reliability a weapon system has a

high probability of completing its mission without failing. However, when a system does fail it is important to have the capability to quickly repair and maintain it. So support and readiness objectives are dependent upon a weapon system's reliability and maintainability characteristics. The MDC system is one tool which the Air Force uses to monitor weapon system R&M. Headquarters Air Force Logistics Command (AFLC) has the responsibility (16:3):

In coordination with the command having PMR (Program Management Responsibility) and using commands, determines the data required to realistically measure reliability, maintainability safety and logistics support costs of operational systems.

AFLC establishes a program including management controls to ascertain that each system fielded by the Air Force achieves its R&M requirements. Included in this program is the MDC system. Further responsibilities of AFLC regarding reliability and maintainability are:

1. Establish and maintain a management information system keyed to work unit codes and based on operations and maintenance data to reflect the degree of achieved R&M for operational systems in operational R&M terms.
2. Establish and maintain a R&M performance feedback system to support the effective design, support, and production of new systems.
3. Furnish appropriate R&M management and data products for operational systems in operational R&M terms to

the implementing command, . . . , and the operating command (14:6).

The management information system which AFLC has today consists of two data areas: maintenance and operations. The system to provide the maintenance data portion is obtained from AFR 66-267, Maintenance Data Collection (MDC) System (15). The operational data is obtained from AFR 65-110, Operational Status and Utilization Data G033 B Reports (12). Both the maintenance and operational data are submitted monthly and inputted into AFLC computers which then generate the fixed formatted reports. The reports dealing principally with equipment or system operational effectiveness are the AFLC D056 series reports (11). Figure 1 depicts how the different sources of data come together and result in the D056 reports which then are used by different agencies.

Problems exist with these D056 reports for agencies who attempt to use them for reliability and maintainability evaluations or studies. Some of the major problems are:

1. Timeliness. The time a weapon system experiences R&M problems to the time the negative trend shows up in a report could easily vary three to six months (3:6).
2. Data reports are fixed formatted. Most data is aggregated to such a point that it is difficult to determine to which base or location the data refers or if all locations are experiencing R&M difficulties.

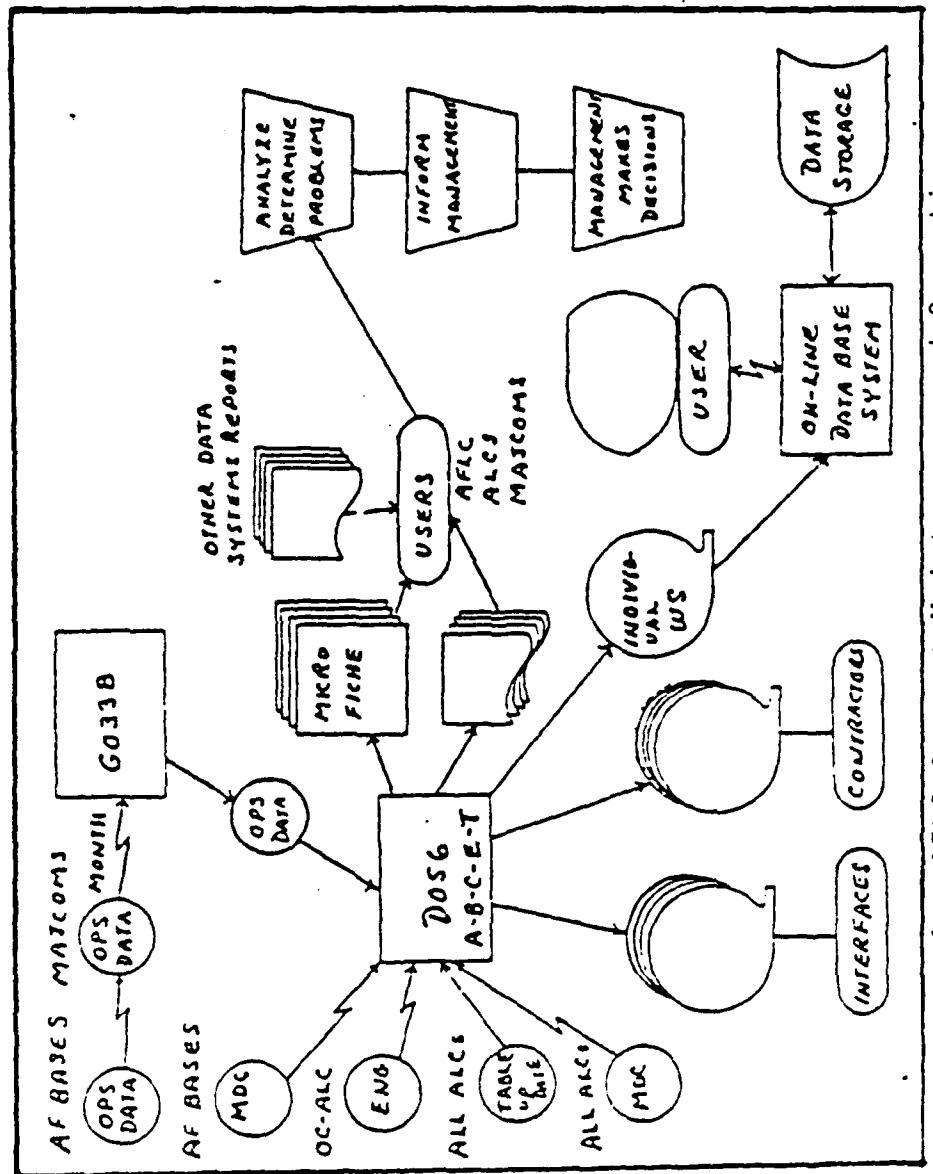


Figure 1. AFLC Current Maintenance and Operations Management Information System (10)

3. Reports do not contain the level of detail necessary to determine what specific equipment or system is causing R&M problems (6).

4. Management information system does not routinely perform automated analysis or trending. Therefore, analysis desired by the R&M engineer must be performed manually. Since this is tedious and intense work, manpower cuts in many organizations has decidedly limited analysis of the data (10:7; 1; 3; 6).

5. Current data systems do not produce information in management usable form. Again, the data must be manually prepared for presentation to the management level to facilitate the decision process (10:7).

The present maintenance and operational data reports fail to meet two users' needs in regard to R&M information. They have acquired access to additional computer resources to improve their R&M analysis. The two organizations are the F-16 System Program Office (SPO), and the Strategic Systems SPO, both of the Aeronautical Systems Division (AFSC organization) at Wright-Patterson Air Force Base. This thesis evaluates and compares the R&M products produced by these two additional data base systems. These additional computer data based systems are the MARCON Computerized Data System for the F-16 SPO (MARCON System), and The Analytic Sciences Corporation (TASC) Field Data Tracking System (FDTS) for the Strategic Systems SPO (TASC System).

Scope

This study was concerned with the two computer data base systems (i.e., MARCON and TASC systems) which two ASD program offices are using to support their R&M analysis. No attempt was made to determine if the AFLC report system was, in fact, inadequate in providing R&M information or any information. It was assumed the program offices had adequate requirements for obtaining additional informational support.

Also, no attempt was made to determine if any other users of the AFLC reports were experiencing any problems with content, format or timeliness of the AFLC reports regarding R&M information.

The goal of this study was to determine if the new data base systems are providing a more timely and usable informational product which can aid the manager decision process.

Objectives of the Research

The objective of this thesis is to analyze two new reliability and maintainability (R&M) data base systems being used by two ASD program offices to determine if they provide an improved information system over the present AFLC generated product performance reports. With an improved source of R&M information, the Air Force would be better able to meet its weapon systems support and readiness goals.

A secondary objective was to compare the two systems in

regard to system compatibility. In the last five years, with the rapid advances in computer technology, there exists the problem of the Air Force's increased use of computer systems that lack commonality. In regard to R&M data bases, it would be beneficial to have the capability to share common R&M information between different weapon systems.

Research Questions

Research questions associated with the research questions are:

1. What are the relative improved performance characteristics of the two new R&M data bases used by ASD?
2. What are the common characteristics of the two new systems?

CHAPTER II

LITERATURE REVIEW

Introduction

Available literature pertinent to this thesis topic centered primarily on the AFLC management information system. There were few documents on the two new data base systems. This is understandable since the AFLC system has been ongoing since the late sixties, while the MARCON and TASC systems have only been operational in the Air Force since 1980-81.

Two research studies and a technical report were generated on the AFLC system by the Air Force Institute of Technology, while the literature covering the newer data systems consisted mainly of contractor reports and Air Force briefings concerning systems capabilities and initial operational goals.

Previous Studies

In August 1967, Major Harold G. Hartley and Captain Richard V. Jamieson (4) wrote a thesis on the use of the Maintenance Data Collection System and its generated reports at the major command level. Previous studies had been conducted at the base level. They did a complete review of the different reports which were created by the MDC system at

that time. They then surveyed the various major commands to determine how effectively the MDC system was being used.

The result of their research showed the MDC system was not being effectively utilized by the major command headquarters (4:71). Their study even indicated the commands were using other sources of information rather than MDC information. They stated,

Command level personnel utilized reports and communications media that were not integral to the MDC system as the primary means of satisfying their management information requirements (4:70).

Another finding in their study was that command special report requirements most successfully fulfilled the MDC requirements of using commands (4:71). Basically, the command reports provided the timeliness lacking in the MDC formal reports. So, back in 1967, the timeliness issue of the MDC reports was as much a problem as it was in the 1980-81 period which led to the MARCON and TASC systems inception.

In February 1971, Captains Irving L. Hoffman and Robert L. Wardrip (8) completed a student thesis proposing criteria and data for a reliability and maintainability information system. Basically, they tried to arrive at standardized terminology to be used by all organizations dealing with reliability and maintainability issues, after which they developed the criteria and data elements. From their study, they concluded that a reliability and maintainability information system should:

1. provide information on what management needs to know about reliability and maintainability,
2. provide a system for collection of pertinent data, and
3. present the information derived from the data in usable form to support the making of decisions (8:102).

They concluded that R&M information on Air Force operational systems was impaired by a pervading lack of confidence in the information's quality (8:105). They even stated:

Perhaps we should accept our operational reliability and maintainability information as approximate and use it as an "indicator" only (8:102).

The results of their research indicated a lack of confidence in the quality of data as provided by the MDC system at that time.

Other Sources

In February 1978, Majors Richard V. Badalamente and Thomas D. Clark wrote a technical report on an analysis they conducted on the MDC system (2). They provided a historical review of the problems attributed to the MDC system since its inception in 1955. They categorized these problems (Table 1) as dealing with accuracy, reliability, accessibility, usability and efficiency (2:11). They stated that reporting data rather than the use of information in the decision

process had received the main emphasis in the MDC system.

One of the conclusions of their report was that to have an effective MDC system you needed to ensure the data was transformed into information and effectively used in the decisional structure.

A January 1983 report from The Analytic Sciences Corporation (TASC) reported on the Field Data Tracking System (FDTS) which TASC developed for the Strategic Systems System Program Office (SSSPO) (9). The report discussed the utility of the present FDTS and how the system might expand in the future. Basically, this data system collected additional maintenance data elements in regard to the MDC system and displayed the information in various formats rather than just a fixed format.

Overall, this TASC document reported on one of the new data base systems being used to provide additional R&M information to a program office.

Summary

This literature review has presented the most pertinent documents dealing in the same general area as this research. Most dealt with the problem areas of the current MDC system. However, these documents show the reasoning behind the development of additional computer resources to support R&M data requirements.

CHAPTER III

METHODOLOGY

Overview of Research

The main procedure used to answer the research questions regarding the MARCON and TASC data base systems was to set up a criteria list by which to evaluate the information provided by the two new systems. With this criteria, both systems can be compared on an equal basis in order to determine whether the systems do provide additional information to aid in R&M analysis.

Informational Criteria

The first set of criteria is very general and can be used to assess various elements of information. The following list of criteria was obtained from the Hoffman and Wardrip thesis (8) concerning the criteria and data necessary for an R&M information system.

1. Is the information accurate enough?
2. Is there enough information available to make decisions?
3. Is the information relevant to the decisions which must be made?
4. Is the information capable of being understood by those who must use it?
5. Is the information available when it is needed?

6. Is compatible information available from a secondary source?
7. Is the overall value of the information adequate for decision-making purposes?

Since the criteria listed above is very general, a second list was developed based on the numerous problem areas associated with the MDC system. These problems were covered in Table 1 and other documents discussed in the literature review chapter. The additional informational system criteria are:

8. Cost
 - initial start-up cost
 - yearly continuation costs
9. Type of reports
 - type of format
 - monthly, 3-month average, cumulative, etc.
10. sources of basic data
 - Are there redundant sources to eliminate inconsistencies?
11. storage capability
 - How many years of data can be stored?
12. tracking capability
 - What level of detail can be stored?
13. Does information match user's needs?
 - Are outputs being used?
14. benefits
 - Have decisions improved?
 - Has time been saved?
15. use of the data base
 - Does it cover the whole weapon system or just a specific area?

Nature and Sources of Data

It became quite difficult to collect sufficient data for the assessment of the criteria lists. Since both the MARCON and TASC systems are fairly new (beginning 1980-81), there was very little written documentation regarding informational output capabilities. Only the TASC system had a formal report and it was prepared by the source contractor and not the Air Force. Therefore, the majority of the data collection was accomplished through interviews with personnel in the program offices who deal with R&M matters. Originally, these interviews were to be conducted using a checklist of questions. This checklist was based on a similar checklist used by Hoffman and Wardrip in their research (8). However, once the actual interviews were started the checklist proved to be inadequate to the uniqueness of each data-based system. Each interview was based on questions generated from an earlier research and other interviews. Basically, it was a stepping stone type process leading to additional data and knowledge at each of the data systems.

For the MARCON system, individuals interviewed were Mr Wally Detert, ASD/ENSSR, in charge of the engineering office dealing with R&M (3), and Mr Jeff Anderson, engineer in the F-16 SPO (1). The source for the majority of the data collected on the TASC system was Mr Phil Hermes, ASD/YYEE, R&M engineer in the Strategic Systems SPO (6). Mr Hermes

was instrumental in obtaining the TASC system for the SPO and is the resident expert on all facets of the TASC system.

Data Analysis

Numerical values were assigned to the two data based systems depending on how each met the criteria. If both systems met a particular criteria each were given a one rating. A rating of zero was given if a system did not meet the criteria. However, if one system is more superior than the other, it will be given an additional value of one for a total rating of two.

The 15 criteria areas do not have the same importance regarding R&M factors. Therefore, the 15 areas were separated into three weighted categories based on their importance with each category assigned a different point value. Then based on the numerized total, a conclusion was made on which data base system best met the overall informational objective. The categories, point values, and criteria breakout is as follows:

<u>Category</u>	<u>Point Values</u>	<u>Criteria #</u>
1. Most Important	3 points	3,5,7,9,12,14,15
2. Average Importance	2 points	1,4,8,10,11,13
3. Minor Importanct	1 point	2,6

CHAPTER IV

RESULTS

Introduction

The main objective of this research effort was to analyze two new reliability and maintainability data base systems to determine if they provide improved information over the present AFLC Maintenance Data Collection reports. Achieving this objective was accomplished by using a set of criteria to subjectively compare characteristics of each data base.

A second objective was to observe how compatible the two system's R&M information might be. This objective was accomplished utilizing the same criteria analysis as mentioned above.

An important point concerning the source of basic maintenance and operational data for the two data bases needs to be made at this time. Basically, the MARCON and TASC systems used the same maintenance and operational data as the present AFLC MDC system. The MARCON system does use the exact same D056 data tapes, based on AFTO 349 maintenance reports that the MDC system uses. However, the MARCON system converts the data into timely and usable information, which will be covered in the following analysis section. While the TASC

system used the same data as the MDC system, it obtains it with base computer tapes rather than the D056 data tapes. However, the TASC system goes further than the MDC system and collects all the data available from the AFTO 349 reports, as well as additional data from forms AFTO 95 and SAC 126 (Figure 2). This also will be covered in the following analysis, while examples of these reports are found in Appendix A.

The point made is that the inputs for the MARCON system are the same as those for the MDC system, while those for the TASC system are much more detailed than those for the MARCON and MDC systems.

Analysis

The analysis was conducted along the criteria lines set up in the previous chapter for the MARCON and TASC systems (first, the general, then the additional criteria). The sources for the information were the respective program offices: for MARCON, the F-16 SPO, and for TASC, the Strategic Systems SPO, unless otherwise indicated.

General Criteria.

1. Accuracy. The MARCON system's accuracy is comparable to the MDC's, as they both use the same inputs as mentioned earlier, while TASC is more accurate since it uses additional data with some of the data being redundant, thereby helping to eliminate inconsistencies (9:2-6).

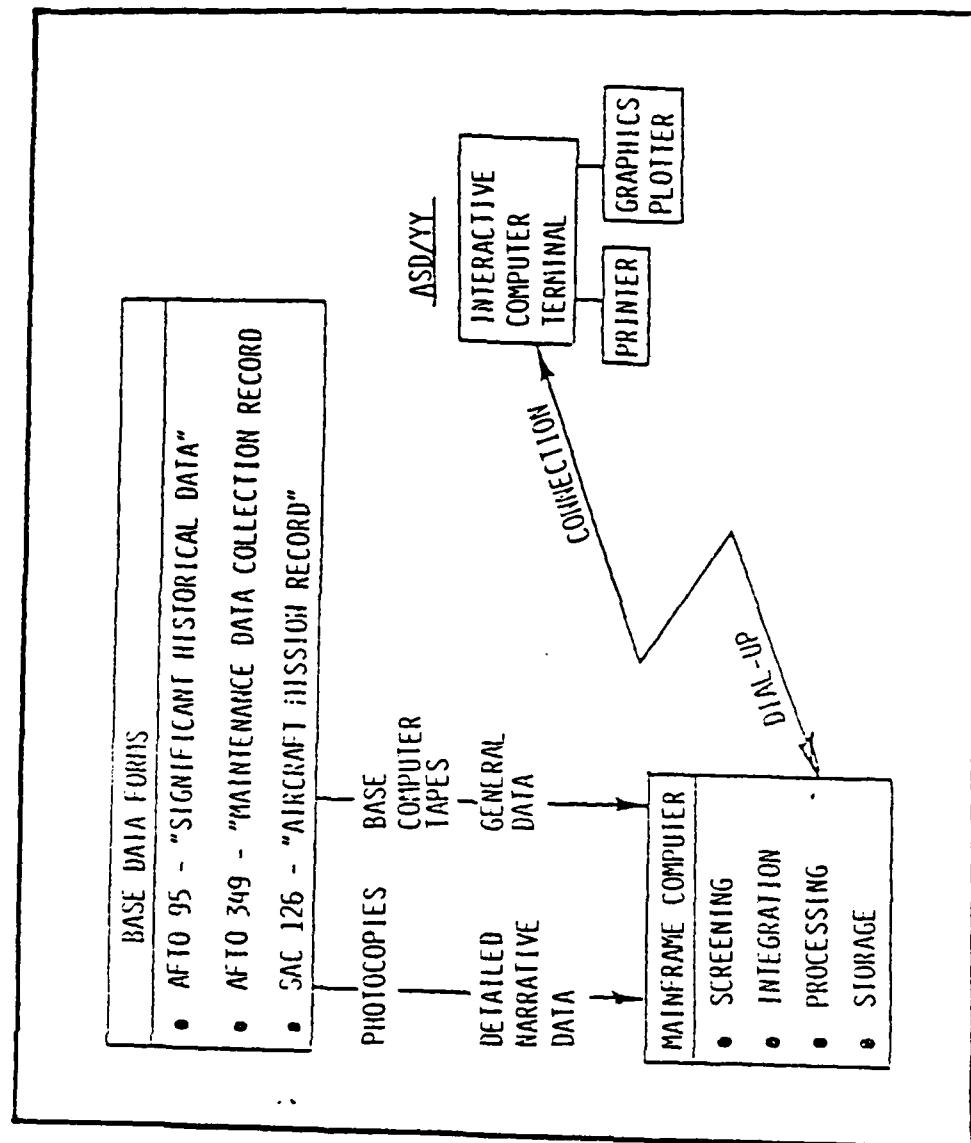


Figure 2. TASC System Flow Chart (6)

2. Quantity. MARCON and TASC systems were the same in this area. Both provided almost unlimited ways to utilize the data for decision-making support.

3. Relevance. The information showed itself to be relevant in both the MARCON and TASC systems due to their timeliness. Each system has the capability to generate "what if" exercises at will, once the input data has been loaded. Neither system is restricted by fixed formats such as the MDC reports.

4. Simplicity. The MARCON or TASC systems can produce several types of graphs which can represent trends or other types of information. The graphs convey information more effectively than pages full of figures.

5. Timeliness. The time required to input the basic data into the two newer systems is roughly the same with the MDC (i.e., 30-60 days after the event). However, once MARCON and TASC systems are inputted with the latest data, any type of informational reporting is available, whereas the MDC can only supply pre-requested information. Both the MARCON and TASC systems have real-time retrievability in obtaining information (See Figure 2 for TASC flow chart). Any special request for data in the MDC system requires additional time for extraction of the information.

6. Compatibility. Only the TASC system has a redundant or secondary source. As shown in Figure 3, the

DATA PROCESSING

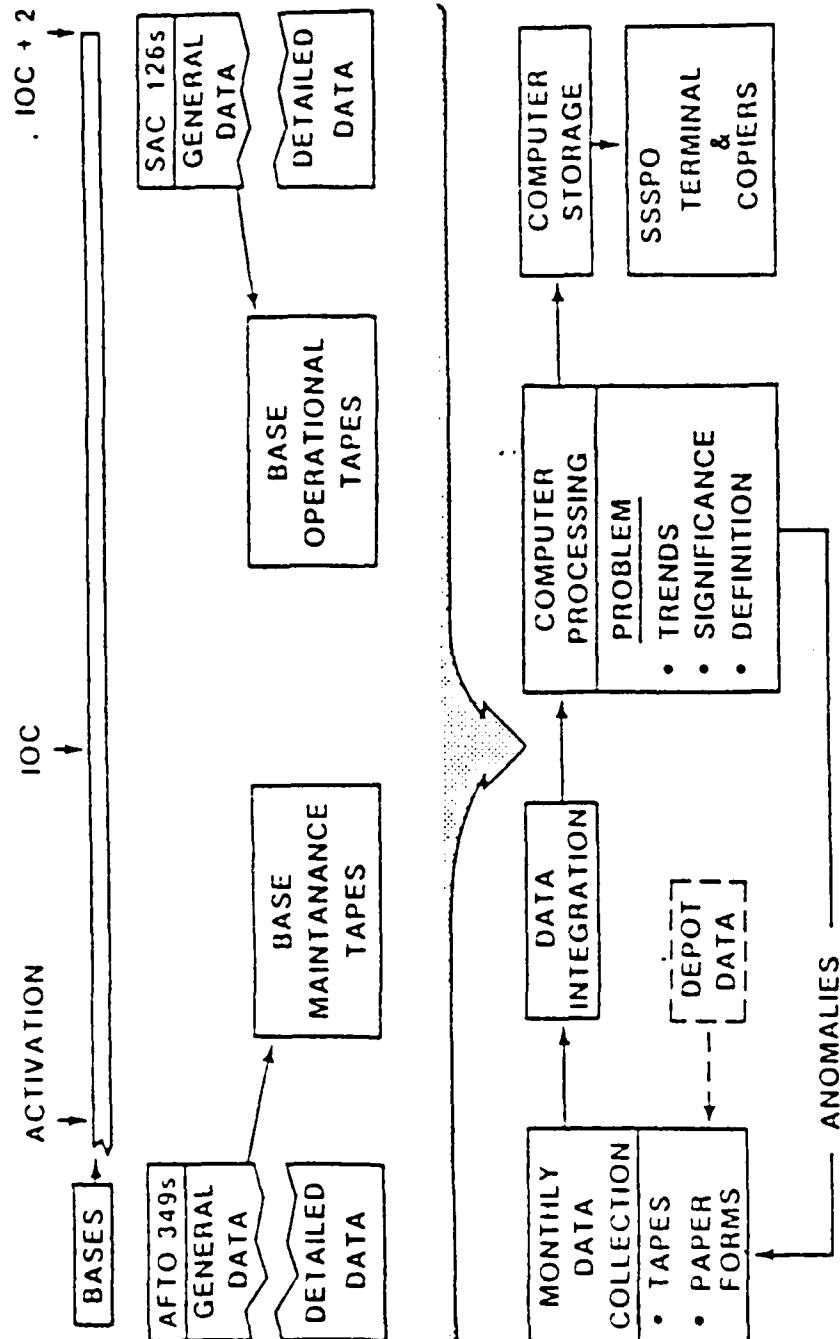


Figure 3. TASC Data Process (6)

TASC system uses the MDC tapes to resolve any anomalies which may occur between the TASC base maintenance tapes and MDC D056 tapes.

7. Quality. The MARCON and TASC systems show the same quality of performance as the MDC system except for the small increase in accuracy for the TASC system resulting from redundant data inputting. The basic reason for the same quality value throughout is that all systems are using the same raw data. Until the collecting and recording of maintenance and operational data improves at the field level, all systems will have the same problem: i.e., output data can be no more accurate than the input data.

Additional Informational Criteria.

8. Cost. Cost data regarding MARCON was unavailable. The development contract for TASC was six million dollars and a twelve-month operational contract was worth \$900,000 (6).

9. Type of Reports. Both the MARCON and TASC systems can provide various report types, i.e., monthly, three-month moving average, cumulative, etc. (See Appendices B and C for examples.) Since each system is real-time, it is up to the user to decide his requirement needs. The TASC system can provide information in either tabular, graphic or narrative form. The flexibility in the TASC system outputs provides useful support spanning three areas: (a) overview

and trend information (Table 2); (b) specific equipment or action information (Table 3); and (c) detailed information (Table 4).

10. Sources of basic data. As discussed earlier, the TASC system is the only one which uses redundant sources: base computer tapes along with MDC basic tapes (Figure 3).

11. Storage capability. The MARCON system can retain all data on the F-16 system back to its operational beginning in 1979. The TASC system has on-line data going back to January 1981. However, the MARCON system includes the majority of the systems on the F-16, i.e., the majority of Work Unit Codes (WUC) in the data base (2800 WUC) (3), whereas the TASC system for the Strategic Systems SPO only has data on two areas: Air Launch Cruise Missile and Offensive Avionics System. Other aircraft equipment/systems data has not been inputted in the TASC system.

12. Tracking capability. MARCON and TASC systems both have the capability to monitor and track maintenance data by base, type of aircraft, Work Unit Codes, and to some degree, line replaceable units/shop replaceable units. However, the TASC can track individual aircraft tail numbers more easily than MARCON.

13. Information and users' needs. MARCON system has been beneficial to all the offices in the F-16 SPO and especially to the R&M engineers. In the early part of 1983,

Table 2
FDTS OVERVIEW AND TREND OUTPUT PRODUCTS

PRODUCT TITLE	BRIEF DESCRIPTION OF PRODUCT	SELECTION OPTIONS
WUC/Failures Ranking Report	Lists the most significant work unit codes in terms of number of completed corrective maintenance actions.	Type Malfunction Base From/To Dates Cutoff Number
WUC/Man-Hours Ranking Report	Lists the most significant work unit codes in terms of man-hours expended in maintenance actions.	Type Malfunction Base From/To Dates Cutoff Number
MTBM Event Trend	Compares MTBM event data for a selected WUC against a theoretical curve for that system component or demonstrates actual MTBM trend.	Plot Scale Type Malfunction Base WUC
Capability Percentage Trend	Demonstrates trends in operational capability percentage for selected avionics systems.	Base End Item SAC Form 126 Version Block Number

Table 3
FDTS EQUIPMENT- OR ACTION-SPECIFIC OUTPUT PRODUCTS

PRODUCT TITLE	BRIEF DESCRIPTION OF PRODUCT	SELECTION OPTIONS
WUC Summary Report	Provides summary total of completed corrective maintenance actions.	Base From/To Dates WUC
WUC JCN Index Report	Provides a list of Job Control Numbers (JCN) for completed corrective maintenance actions.	Type Malfunction Base From/To Dates WUC
WUC/How Malfunctioned Report	Lists the most significant how malfunction codes.	Type Malfunction Base From/To Dates Cutoff Number WUC

Table 4
FDTS DETAILED INFORMATION OUTPUT PRODUCTS

PRODUCT TITLE	BRIEF DESCRIPTION OF PRODUCT	SELECTION OPTIONS
Work Unit Code (WUC) Detail Query	Displays descriptions of the various types of maintenance actions performed and estimates of the man-hours expended on each one.	Type Malfunction Base From/To Dates WUC
Job Control Number (JCN) Detail Query	Displays field operations data and maintenance action information from multiple sources.	Base JCN and Year

the program office thought they had an R&M problem with the F-16s at MacDill AFB and Hill AFB. The MARCON data system reports enabled the SPO to reduce the time in determining the actual problem. It was found that the problem was not with any system R&M but rather how maintenance actions were reported. The TASC reports are used to indicate when problems in R&M start to occur. Based on these reports, the SPO can use the information to prioritize problems. Before the TASC system, problems were solved on a "first-come, first served" basis which often led to poor utilization of funds.

14. Benefits. In both systems, the greatest benefit has been in the area of timeliness. The systems save many manhours in collecting, analyzing, and preparing data to solve problems which may arise in the R&M area. Personnel can now spend more time analyzing and evaluating information rather than in collecting the data.

15. Use of the data base. As discussed earlier, the MARCON system covers the majority of equipment on the F-16 system, whereas the TASC system has been very specific in that it only has two subsystems in its data base: the Air Launch Cruise Missile and the Offensive Avionics System.

Numerical Analysis

Based upon the above analysis of each system regarding the 15 criteria areas, a subjective rating was assigned to each system. From the ratings and point values the total

amount of points was determined for each data base system.

For the cost criteria (Number 8), both systems were assigned a rating of zero since cost figures for MARCON and MDC systems were unavailable. The problem with obtaining the cost figures for the MDC system is breaking out the costs specifically incurred by the F-16 and Offensive Avionics/Air Launch Cruise Missile Systems.

The results of the subjective numerical analysis are shown in the matrix below. Even though both systems accumulated 36 points this does not necessarily mean both systems are totally equal. A basic difference will be discussed in the next chapter.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study was accomplished by addressing two research questions:

1. What are the relative improved performance characteristics of the two new Reliability and Maintainability data bases (MARCON and TASC systems) used by Aeronautical Systems Division (F-16 and Strategic Systems SPOs)?
2. What are the common characteristics of the two new systems?

Research Questions. In order to answer both these questions, it was appropriate to set up common informational criteria, against which both systems were evaluated. The criteria were comprised of a general category, obtained from a previous research thesis which dealt with R&M informational systems, and a specific set of criteria which was closely associated with problem areas experienced by the current Maintenance Data Collection System. Once the criteria were established, a numerical evaluation of the data systems was conducted.

As a result of the evaluation and answering the research

questions, the objectives of this research could be assessed. These objectives were:

1. Main Objective: Do the new systems provide improved R&M information over the present MDC reports?
2. Secondary Objective: Is the R&M information of each system compatible?

Conclusions

Objective 1. Based on the analysis of the data base systems, it can be concluded that both the MARCON and TASC data base systems do provide improved R&M information. The key area of improvement was in timeliness. Each of the systems could assess their data bases in a real-time matter and provide numerous types of formatted documents. By reducing the time requirements, manpower and funds could be saved. But the greatest benefit was that now managers would have access to timely information to aid them in their decision-making processes. Therefore, overall system reliability and maintainability should improve, resulting in weapon systems which meet the supportability and readiness requirements.

Objective 2. The second objective dealt with the compatibility of the two R&M data bases. This study showed no evidence in which the two systems could share basic data from system to system. However, based on the types and formats of each systems output, it would appear that a manual

analysis and comparison could easily be accomplished

Final Conclusion. As shown in objective one above both systems do provide improved R&M information compared to the MDC data system. Also based on the numerical analysis matrix, both systems equaled 36 points. The conclusion drawn from these findings could be that both systems are totally equal and one is not better than the other. However, that is not the fact. Each system has superiority in the particular area for which it was developed. MARCON is a general system and provides maintenance data on the whole F-16 system. Whereas the TASC system was used specifically for two components of an overall weapon system. For overall weapon system R&M, MARCON is superior where TASC is superior in regards to the total R&M picture for a particular component.

The basic finding of this research is that both data base systems do provide their users with timely R&M data. With this data the users have available to them information which allows for effective decision making.

Recommendations

This research effort surfaced some issues related to the subject that need further research. This study concluded that the two new data systems do provide improved R&M data. However, it did not consider the cost effectiveness of the improved capability. An area of further research would be

to perform a cost analysis study to determine the financial implications of the additional data systems.

In gathering the data for this study, it was learned that AFLC will be supplementing their present MDC system with a new data system called Maintenance and Operational Data Access System (MODAS). It will be very similar to the F-16 SPO system since MARCON will be the contractor. It is projected to be operational in the early part of 1984. After this system becomes fully functional, it might provide possible areas in which further R&M information research could be performed.

And finally, an area where research is required is in the collection and reporting of maintenance and operational events. No matter how much one improves the computer systems which store, process and analyze data, if erroneous data is put into the computer originally, the final output can only be comparable. So it is imperative that the data collected and reported is error free. While researching this thesis, the fact of input errors always came up in the discussions. With the current trend to improve the output side of the maintenance and operations data base systems, maybe some organization will also attempt to improve the input side. Only then will the Logistic System be able to properly monitor and evaluate weapon system reliability and maintainability.

APPENDIX A
MAINTENANCE DATA COLLECTION REPORTS

SIGNIFICANT HISTORICAL DATA				DATA	DATA	DATA	DATA
DATE	CODE	DESCRIPTION	DATE	DATA	DATA	DATA	DATA
11 Jun 82 (0)	Arrive Griffiss	Received NAV monitor Removed NAV monitor Installed NAV monitor Installed NAV monitor Sys op checks good L3, 8/02/82/1	01637 01637 03310 03310 188	291 189	Adjusted on SIT Adjusted on SIT unit op. ct. good L1/00402/11		
	1622446 NAV mkr at null bright are very dim.	R2 RTH R2 RSC L1/03248/1	00394 00394	30 132	Rate c... 7 Rate code 7	00054	
14 Jun 82	1664845 CANN Action	Removed for A/CD160					
	1612223 -211NSP/MT.4BAL	N.F.D. Installed NAV ... 03310					
10 Jul 82	16692125 C/N pylon and asset In check out	Copy with COMPLY WITH	03311 02642	NA NA	NA NA	NA	
18 Jun 82	171742120 TC-2 light on constantly	Repaired pilot TC light 03310 Sys op checks good		NA	NA		
23 Jun 82							

AFTO 95
Previous editions are obse

Form AFTO 95 used to record Significant Historical Data

MISSION RECORD - AVIONICS										REPORTS CONTROL STATUS	
PART 1		MISSION DATA									
01	4	116	52	6	4	8	7	05	40	11	1
NO.	SYSTEM	PART 2		AVIONICS DISCREPANCIES							
1	Auto Pilot			42/3 1802439 (PBU) TA trace unusable all ranges. 43/2 2182410 (DFCS) TO+6:00 Dot cursor indicated 5° low at end of the flight turret was stoved 5° left. 43/2 2182406 (DFCS) TO+14 min during normal prediction CI with turret full down limit light blinked once then went off. (in all modes.) 43/2 2182407 (DFCS) TO+20 min. During azimuth sideslip rate + gyro servos as circle cursor would not drive through LT scope limits without a large input. 43/2 2182408 (DFCS) TO+27 min. In Emer on mode #2 circle cursor appeared 5° RT of scope center. 43/2 2182409 (DFCS) TO+2:25 Sys would not track chaff or real targets in RT/RR system would track real targets in MC/RR. 53/2 2152425 (PBU) LT outbd gradually decreases.							
2	Nav Radio										
3	Com Radio										
4	Intercom										
5	External Sensors										
6	External Sensors										
7	External Sensors										
8	External Sensors										
9	External Sensors										
10	External Sensors										
11	External Sensors										
12	External Sensors										
13	External Sensors										
14	External Sensors										
15	External Sensors										
16	External Sensors										
17	External Sensors										
18	External Sensors										
19	External Sensors										
20	External Sensors										
21	External Sensors										
22	External Sensors										
23	External Sensors										
24	External Sensors										
25	External Sensors										
26	External Sensors										
27	External Sensors										
28	External Sensors										
29	External Sensors										
30	External Sensors										
31	External Sensors										
32	External Sensors										
33	External Sensors										
34	External Sensors										
35	External Sensors										
36	External Sensors										
37	External Sensors										
38	External Sensors										
39	External Sensors										
40	External Sensors										
41	External Sensors										
42	External Sensors										
43	External Sensors										
44	External Sensors										
45	External Sensors										
46	External Sensors										
47	External Sensors										
48	External Sensors										
49	External Sensors										
50	External Sensors										
51	External Sensors										
52	External Sensors										
53	External Sensors										
54	External Sensors										
55	External Sensors										
56	External Sensors										
57	External Sensors										
58	External Sensors										
59	External Sensors										
60	External Sensors										
61	External Sensors										
62	External Sensors										
63	External Sensors										
64	External Sensors										
65	External Sensors										
66	External Sensors										
67	External Sensors										
68	External Sensors										
69	External Sensors										
70	External Sensors										
71	External Sensors										
72	External Sensors										
73	External Sensors										
74	External Sensors										
75	External Sensors										
76	External Sensors										
77	External Sensors										
78	External Sensors										
79	External Sensors										
80	External Sensors										
81	External Sensors										
82	External Sensors										
83	External Sensors										
84	External Sensors										
85	External Sensors										
86	External Sensors										
87	External Sensors										
88	External Sensors										
89	External Sensors										
90	External Sensors										
91	External Sensors										
92	External Sensors										
93	External Sensors										
94	External Sensors										
95	External Sensors										
96	External Sensors										
97	External Sensors										
98	External Sensors										
99	External Sensors										
100	External Sensors										
101	External Sensors										
102	External Sensors										
103	External Sensors										
104	External Sensors										
105	External Sensors										
106	External Sensors										
107	External Sensors										
108	External Sensors										
109	External Sensors										
110	External Sensors										
111	External Sensors										
112	External Sensors										
113	External Sensors										
114	External Sensors										
115	External Sensors										
116	External Sensors										
117	External Sensors										
118	External Sensors										
119	External Sensors										
120	External Sensors										
121	External Sensors										
122	External Sensors										
123	External Sensors										
124	External Sensors										
125	External Sensors										
126	External Sensors										
127	External Sensors										
128	External Sensors										
129	External Sensors										
130	External Sensors										
131	External Sensors										
132	External Sensors										
133	External Sensors										
134	External Sensors										
135	External Sensors										
136	External Sensors										
137	External Sensors										
138	External Sensors										
139	External Sensors										
140	External Sensors										
141	External Sensors										
142	External Sensors										
143	External Sensors										
144	External Sensors										
145	External Sensors										
146	External Sensors										
147	External Sensors										
148	External Sensors										
149	External Sensors										
150	External Sensors										
151	External Sensors										
152	External Sensors										
153	External Sensors										
154	External Sensors										
155	External Sensors										
156	External Sensors										
157	External Sensors										
158	External Sensors										
159	External Sensors										
160	External Sensors										
161	External Sensors										
162	External Sensors										
163	External Sensors										
164	External Sensors										
165	External Sensors										
166	External Sensors										
167	External Sensors										
168	External Sensors										
169	External Sensors										
170	External Sensors										
171	External Sensors										
172	External Sensors										
173	External Sensors										
174	External Sensors										
175	External Sensors										
176	External Sensors										
177	External Sensors										
178	External Sensors										
179	External Sensors										
180	External Sensors										
181	External Sensors										
182	External Sensors										
183	External Sensors										
184	External Sensors										
185	External Sensors										
186	External Sensors										
187	External Sensors										
188	External Sensors										
189	External Sensors										
190	External Sensors										
191	External Sensors										
192	External Sensors										
193	External Sensors										
194	External Sensors										
195	External Sensors										
196	External Sensors										
197	External Sensors										
198	External Sensors										
199	External Sensors										
200	External Sensors										
201	External Sensors										
202	External Sensors										
203	External Sensors										
204	External Sensors										
205	External Sensors										
206	External Sensors										
207	External Sensors										
208	External Sensors										
209	External Sensors										
210	External Sensors										
211	External Sensors										
212	External Sensors										
213	External Sensors										
214	External Sensors										
215	External Sensors										
216	External Sensors										
217	External Sensors										
218	External Sensors										
219	External Sensors										
220	External Sensors										
221	External Sensors										
222	External Sensors										
223	External Sensors										
224	External Sensors										
225	External Sensors										
226	External Sensors										
227	External Sensors										
228	External Sensors										
229	External Sensors										
230	External Sensors										
231	External Sensors										
232	External Sensors										
233	External Sensors										
234	External Sensors										
235	External Sensors										
236	External Sensors										
237	External Sensors										
238	External Sensors										
239	External Sensors										
240	External Sensors										
241	External Sensors										
242	External Sensors										
243	External Sensors										
244	External Sensors										
245	External Sensors										
246	External Sensors										
247	External Sensors										
248	External Sensors										
249	External Sensors										
250	External Sensors										
251	External Sensors										
252	External Sensors										
253	External Sensors										
254	External Sensors										
255	External Sensors										
256	External Sensors										
257	External Sensors										
258	External Sensors										
259	External Sensors										
260	External Sensors										
261	External Sensors										
262	External Sensors										
263	External Sensors										
264	External Sensors										
265	External Sensors										
266	External Sensors										
267	External Sensors										
268	External Sensors										
269	External Sensors										
270	External Sensors										
271	External Sensors										
272	External Sensors										
273	External Sensors										
274	External Sensors										
275	External Sensors										
276	External Sensors										
277	External Sensors										
278	External Sensors										
279	External Sensors										
280	External Sensors										
281	External Sensors										
282	External Sensors										
283	External Sensors										
284	External Sensors										
285	External Sensors										
286	External Sensors										
287	External Sensors										
288	External Sensors										
289	External Sensors										
290	External Sensors										
291	External Sensors										
292	External Sensors										
293	External Sensors										
294	External Sensors										
295	External Sensors										
296	External Sensors										
297	External Sensors										
298	External Sensors										
299	External Sensors										
300	External Sensors										
301	External Sensors										
302	External Sensors										
303	External Sensors										
304	External Sensors										
305	External Sensors										
306	External Sensors										
307	External Sensors										
308	External Sensors										
309	External Sensors										
310	External Sensors										
311	External Sensors										
312	External Sensors										
313	External Sensors										
314	External Sensors										
315	External Sensors										
316	External Sensors										
317	External Sensors										
318	External Sensors										
319	External Sensors										

Form AFTO 95 used to record Significant Historical Data

Form SAC 126F used to record Mission Record - Avionics

Front

MAINTENANCE DATA COLLECTION RECORD										ITEM NO 11-4007
1. DATE	2. CONCERNED	3. D. OF PRACTIC. NO.	4. C. NO.	5. SAD	6. TIME	7. PER	8. DATE REC'D.	9. LOCATION	10. DATE	11. DATE REC'D.
2/19/85	25410	3N-0855			10 010				10 010	
12. TIME	13. DURATION	14. TEST AND TIME	15. MDTL. TIME	16.	17.	18.	19. DATE REC'D.	20. LOCATION	21.	22.
10 010	10 010	10 010	10 010		10 010				10 010	
23. DATE	24. PART NUMBER	25. MDTL. NO.	26. TEST NO.	27. MDTL. NO.	28. MDTL. NO.	29. MDTL. NO.	30. MDTL. NO.	31. MDTL. NO.	32. MDTL. NO.	33. MDTL. NO.
23. 01	24. 01000	25. 01000	26. 01000	27. 01000	28. 01000	29. 01000	30. 01000	31. 01000	32. 01000	33. 01000
34. DATE	35. PART NUMBER	36. MDTL. NO.	37. TEST NO.	38. MDTL. NO.	39. MDTL. NO.	40. MDTL. NO.	41. MDTL. NO.	42. MDTL. NO.	43. MDTL. NO.	44. MDTL. NO.
34. 01	35. 01000	36. 01000	37. 01000	38. 01000	39. 01000	40. 01000	41. 01000	42. 01000	43. 01000	44. 01000
45. DATE	46. PART NUMBER	47. MDTL. NO.	48. TEST NO.	49. MDTL. NO.	50. MDTL. NO.	51. MDTL. NO.	52. MDTL. NO.	53. MDTL. NO.	54. MDTL. NO.	55. MDTL. NO.
45. 01	46. 01000	47. 01000	48. 01000	49. 01000	50. 01000	51. 01000	52. 01000	53. 01000	54. 01000	55. 01000
56. DATE	57. PART NUMBER	58. MDTL. NO.	59. TEST NO.	60. MDTL. NO.	61. MDTL. NO.	62. MDTL. NO.	63. MDTL. NO.	64. MDTL. NO.	65. MDTL. NO.	66. MDTL. NO.
56. 01	57. 01000	58. 01000	59. 01000	60. 01000	61. 01000	62. 01000	63. 01000	64. 01000	65. 01000	66. 01000
67. DATE	68. PART NUMBER	69. MDTL. NO.	70. TEST NO.	71. MDTL. NO.	72. MDTL. NO.	73. MDTL. NO.	74. MDTL. NO.	75. MDTL. NO.	76. MDTL. NO.	77. MDTL. NO.
67. 01	68. 01000	69. 01000	70. 01000	71. 01000	72. 01000	73. 01000	74. 01000	75. 01000	76. 01000	77. 01000
78. DATE	79. PART NUMBER	80. MDTL. NO.	81. TEST NO.	82. MDTL. NO.	83. MDTL. NO.	84. MDTL. NO.	85. MDTL. NO.	86. MDTL. NO.	87. MDTL. NO.	88. MDTL. NO.
78. 01	79. 01000	80. 01000	81. 01000	82. 01000	83. 01000	84. 01000	85. 01000	86. 01000	87. 01000	88. 01000
89. DATE	90. PART NUMBER	91. MDTL. NO.	92. TEST NO.	93. MDTL. NO.	94. MDTL. NO.	95. MDTL. NO.	96. MDTL. NO.	97. MDTL. NO.	98. MDTL. NO.	99. MDTL. NO.
89. 01	90. 01000	91. 01000	92. 01000	93. 01000	94. 01000	95. 01000	96. 01000	97. 01000	98. 01000	99. 01000
100. DATE	101. PART NUMBER	102. MDTL. NO.	103. TEST NO.	104. MDTL. NO.	105. MDTL. NO.	106. MDTL. NO.	107. MDTL. NO.	108. MDTL. NO.	109. MDTL. NO.	110. MDTL. NO.
100. 01	101. 01000	102. 01000	103. 01000	104. 01000	105. 01000	106. 01000	107. 01000	108. 01000	109. 01000	110. 01000
111. DATE	112. PART NUMBER	113. MDTL. NO.	114. TEST NO.	115. MDTL. NO.	116. MDTL. NO.	117. MDTL. NO.	118. MDTL. NO.	119. MDTL. NO.	120. MDTL. NO.	121. MDTL. NO.
111. 01	112. 01000	113. 01000	114. 01000	115. 01000	116. 01000	117. 01000	118. 01000	119. 01000	120. 01000	121. 01000
122. DATE	123. PART NUMBER	124. MDTL. NO.	125. TEST NO.	126. MDTL. NO.	127. MDTL. NO.	128. MDTL. NO.	129. MDTL. NO.	130. MDTL. NO.	131. MDTL. NO.	132. MDTL. NO.
122. 01	123. 01000	124. 01000	125. 01000	126. 01000	127. 01000	128. 01000	129. 01000	130. 01000	131. 01000	132. 01000
133. DATE	134. PART NUMBER	135. MDTL. NO.	136. TEST NO.	137. MDTL. NO.	138. MDTL. NO.	139. MDTL. NO.	140. MDTL. NO.	141. MDTL. NO.	142. MDTL. NO.	143. MDTL. NO.
133. 01	134. 01000	135. 01000	136. 01000	137. 01000	138. 01000	139. 01000	140. 01000	141. 01000	142. 01000	143. 01000
144. DATE	145. PART NUMBER	146. MDTL. NO.	147. TEST NO.	148. MDTL. NO.	149. MDTL. NO.	150. MDTL. NO.	151. MDTL. NO.	152. MDTL. NO.	153. MDTL. NO.	154. MDTL. NO.
144. 01	145. 01000	146. 01000	147. 01000	148. 01000	149. 01000	150. 01000	151. 01000	152. 01000	153. 01000	154. 01000
155. DATE	156. PART NUMBER	157. MDTL. NO.	158. TEST NO.	159. MDTL. NO.	160. MDTL. NO.	161. MDTL. NO.	162. MDTL. NO.	163. MDTL. NO.	164. MDTL. NO.	165. MDTL. NO.
155. 01	156. 01000	157. 01000	158. 01000	159. 01000	160. 01000	161. 01000	162. 01000	163. 01000	164. 01000	165. 01000
166. DATE	167. PART NUMBER	168. MDTL. NO.	169. TEST NO.	170. MDTL. NO.	171. MDTL. NO.	172. MDTL. NO.	173. MDTL. NO.	174. MDTL. NO.	175. MDTL. NO.	176. MDTL. NO.
166. 01	167. 01000	168. 01000	169. 01000	170. 01000	171. 01000	172. 01000	173. 01000	174. 01000	175. 01000	176. 01000
177. DATE	178. PART NUMBER	179. MDTL. NO.	180. TEST NO.	181. MDTL. NO.	182. MDTL. NO.	183. MDTL. NO.	184. MDTL. NO.	185. MDTL. NO.	186. MDTL. NO.	187. MDTL. NO.
177. 01	178. 01000	179. 01000	180. 01000	181. 01000	182. 01000	183. 01000	184. 01000	185. 01000	186. 01000	187. 01000
188. DATE	189. PART NUMBER	190. MDTL. NO.	191. TEST NO.	192. MDTL. NO.	193. MDTL. NO.	194. MDTL. NO.	195. MDTL. NO.	196. MDTL. NO.	197. MDTL. NO.	198. MDTL. NO.
188. 01	189. 01000	190. 01000	191. 01000	192. 01000	193. 01000	194. 01000	195. 01000	196. 01000	197. 01000	198. 01000
199. DATE	200. PART NUMBER	201. MDTL. NO.	202. TEST NO.	203. MDTL. NO.	204. MDTL. NO.	205. MDTL. NO.	206. MDTL. NO.	207. MDTL. NO.	208. MDTL. NO.	209. MDTL. NO.
199. 01	200. 01000	201. 01000	202. 01000	203. 01000	204. 01000	205. 01000	206. 01000	207. 01000	208. 01000	209. 01000
210. DATE	211. PART NUMBER	212. MDTL. NO.	213. TEST NO.	214. MDTL. NO.	215. MDTL. NO.	216. MDTL. NO.	217. MDTL. NO.	218. MDTL. NO.	219. MDTL. NO.	220. MDTL. NO.
210. 01	211. 01000	212. 01000	213. 01000	214. 01000	215. 01000	216. 01000	217. 01000	218. 01000	219. 01000	220. 01000
221. DATE	222. PART NUMBER	223. MDTL. NO.	224. TEST NO.	225. MDTL. NO.	226. MDTL. NO.	227. MDTL. NO.	228. MDTL. NO.	229. MDTL. NO.	230. MDTL. NO.	231. MDTL. NO.
221. 01	222. 01000	223. 01000	224. 01000	225. 01000	226. 01000	227. 01000	228. 01000	229. 01000	230. 01000	231. 01000
232. DATE	233. PART NUMBER	234. MDTL. NO.	235. TEST NO.	236. MDTL. NO.	237. MDTL. NO.	238. MDTL. NO.	239. MDTL. NO.	240. MDTL. NO.	241. MDTL. NO.	242. MDTL. NO.
232. 01	233. 01000	234. 01000	235. 01000	236. 01000	237. 01000	238. 01000	239. 01000	240. 01000	241. 01000	242. 01000
243. DATE	244. PART NUMBER	245. MDTL. NO.	246. TEST NO.	247. MDTL. NO.	248. MDTL. NO.	249. MDTL. NO.	250. MDTL. NO.	251. MDTL. NO.	252. MDTL. NO.	253. MDTL. NO.
243. 01	244. 01000	245. 01000	246. 01000	247. 01000	248. 01000	249. 01000	250. 01000	251. 01000	252. 01000	253. 01000
254. DATE	255. PART NUMBER	256. MDTL. NO.	257. TEST NO.	258. MDTL. NO.	259. MDTL. NO.	260. MDTL. NO.	261. MDTL. NO.	262. MDTL. NO.	263. MDTL. NO.	264. MDTL. NO.
254. 01	255. 01000	256. 01000	257. 01000	258. 01000	259. 01000	260. 01000	261. 01000	262. 01000	263. 01000	264. 01000
265. DATE	266. PART NUMBER	267. MDTL. NO.	268. TEST NO.	269. MDTL. NO.	270. MDTL. NO.	271. MDTL. NO.	272. MDTL. NO.	273. MDTL. NO.	274. MDTL. NO.	275. MDTL. NO.
265. 01	266. 01000	267. 01000	268. 01000	269. 01000	270. 01000	271. 01000	272. 01000	273. 01000	274. 01000	275. 01000
276. DATE	277. PART NUMBER	278. MDTL. NO.	279. TEST NO.	280. MDTL. NO.	281. MDTL. NO.	282. MDTL. NO.	283. MDTL. NO.	284. MDTL. NO.	285. MDTL. NO.	286. MDTL. NO.
276. 01	277. 01000	278. 01000	279. 01000	280. 01000	281. 01000	282. 01000	283. 01000	284. 01000	285. 01000	286. 01000
287. DATE	288. PART NUMBER	289. MDTL. NO.	290. TEST NO.	291. MDTL. NO.	292. MDTL. NO.	293. MDTL. NO.	294. MDTL. NO.	295. MDTL. NO.	296. MDTL. NO.	297. MDTL. NO.
287. 01	288. 01000	289. 01000	290. 01000	291. 01000	292. 01000	293. 01000	294. 01000	295. 01000	296. 01000	297. 01000
298. DATE	299. PART NUMBER	300. MDTL. NO.	301. TEST NO.	302. MDTL. NO.	303. MDTL. NO.	304. MDTL. NO.	305. MDTL. NO.	306. MDTL. NO.	307. MDTL. NO.	308. MDTL. NO.
298. 01	299. 01000	300. 01000	301. 01000	302. 01000	303. 01000	304. 01000	305. 01000	306. 01000	307. 01000	308. 01000
309. DATE	310. PART NUMBER	311. MDTL. NO.	312. TEST NO.	313. MDTL. NO.	314. MDTL. NO.	315. MDTL. NO.	316. MDTL. NO.	317. MDTL. NO.	318. MDTL. NO.	319. MDTL. NO.
309. 01	310. 01000	311. 01000	312. 01000	313. 01000	314. 01000	315. 01000	316. 01000	317. 01000	318. 01000	319. 01000
320. DATE	321. PART NUMBER	322. MDTL. NO.	323. TEST NO.	324. MDTL. NO.	325. MDTL. NO.	326. MDTL. NO.	327. MDTL. NO.	328. MDTL. NO.	329. MDTL. NO.	330. MDTL. NO.
320. 01	321. 01000	322. 01000	323. 01000	324. 01000	325. 01000	326. 01000	327. 01000	328. 01000	329. 01000	330. 01000
331. DATE	332. PART NUMBER	333. MDTL. NO.	334. TEST NO.	335. MDTL. NO.	336. MDTL. NO.	337. MDTL. NO.	338. MDTL. NO.	339. MDTL. NO.	340. MDTL. NO.	341. MDTL. NO.
331. 01	332. 01000	333. 01000	334. 01000	335. 01000	336. 01000	337. 01000	338. 01000	339. 01000	340. 01000	341. 01000
342. DATE	343. PART NUMBER	344. MDTL. NO.	345. TEST NO.	346. MDTL. NO.	347. MDTL. NO.	348. MDTL. NO.	349. MDTL. NO.	350. MDTL. NO.	351. MDTL. NO.	352. MDTL. NO.
342. 01	343. 01000	344. 01000	345. 01000	346. 01000	347. 01000	348. 01000	349. 01000	350. 01000	351. 01000	352. 01000
353. DATE	354. PART NUMBER	355. MDTL. NO.	356. TEST NO.	357. MDTL. NO.	358. MDTL. NO.	359. MDTL. NO.	360. MDTL. NO.	361. MDTL. NO.	362. MDTL. NO.	363. MDTL. NO.
353. 01	354. 01000	355. 01000	356. 01000	357. 01000	358. 01000	359. 01000	360. 01000	361. 01000	362. 01000	363. 01000
364. DATE	365. PART NUMBER	366. MDTL. NO.	367. TEST NO.	368. MDTL. NO.	369. MDTL. NO.	370. MDTL. NO.	371. MDTL. NO.	372. MDTL. NO.	373. MDTL. NO.	374. MDTL. NO.
364. 01	365. 01000	366. 01000	367. 01000	368. 01000	369. 01000	370. 01000	371. 01000	372. 01000	373. 01000	374. 01000
375. DATE	376. PART NUMBER	377. MDTL. NO.	378. TEST NO.	379. MDTL. NO.	380. MDTL. NO.	381. MDTL. NO.	382. MDTL. NO.	383. MDTL. NO.	384. MDTL. NO.	385. MDTL. NO.
375. 01	376. 01000	377. 01000	378. 01000	379. 01000	380. 01000	381. 01000	382. 01000	383. 01000	384. 01000	385. 01000
386. DATE	387. PART NUMBER	388. MDTL. NO.	389. TEST NO.	390. MDTL. NO.	391. MDTL. NO.	392. MDTL. NO.	393. MDTL. NO.	394. MDTL. NO.	395. MDTL. NO.	396. MDTL. NO.
386. 01	387. 01000	388. 01000	389. 01000	390. 01000	391. 01000	392. 01000	393. 01000	394. 01000	395. 01000	396. 01000
397. DATE	398. PART NUMBER	399. MDTL. NO.	400. TEST NO.	401. MDTL. NO.	402. MDTL. NO.	403. MDTL. NO.	404. MDTL. NO.	405. MDTL. NO.	406. MDTL. NO.	407. MDTL. NO.
397. 01	398. 01000	399. 01000	400. 01000	401. 01000						

Form SAC 126F used to record Mission Record - Avionics

APPENDIX B
EXAMPLES OF MARCON COMPUTERIZED MAINTENANCE DATA

RELIABILITY STATUS REPORT

HUC: 51FA0
TYPE 1 FAILURES COMPUTER, CENTRAL AIR DATA
EQUIPMENT LEVEL 4 USHF HFE
PROJECTED CUM ITEM# HT 500K FLTHPS

PAGE 1 OF 3 PAGES 831207

DATE	FLYING HOURS	CUM. FLIGHT HOURS	FAIL	MONTHLY HCTHL	3 MONTH AVERAGE	ACTUAL CUM. ITEM#	PROJ. CUM. ITEM#
79/01	43	0	0	0.00	0.00	0.00	0.00
79/02	95	95	1	95.00	138.00	0.00	0.00
79/03	45	92	0	0.00	265.00	0.00	0.00
79/04	84	125	474	0.00	474.00	0.00	0.00
79/05	145	172	751	0.00	751.00	0.00	0.00
79/06	109	261	1061	0.00	1061.00	0.00	0.00
79/07	153	154	1448	0.00	1448.00	0.00	0.00
79/08	184	177	1809	0.00	1809.00	0.00	0.00
79/09	341	335	2435	0.00	2435.00	0.00	0.00
79/10	557	451	3493	0.00	3493.00	0.00	0.00
79/11	593	367	4458	1	293.00	2229.00	0.00
79/12	502	377	5327	2	537.00	1067.40	0.00
80/01	599	475	6411	2	485.00	2151.00	0.00
80/02	762	766	7735	1	486.00	1620.00	0.00
80/03	597	525	9257	1	1522.00	956.00	0.00
80/04	991	991	11057	2	975.00	1149.00	0.00
80/05	1207	714	12928	4	486.25	1741.00	0.00
80/06	1332	654	14954	0	0.00	949.50	0.00
80/07	1669	731	17294	0	0.00	1047.83	0.00
80/08	1572	878	19744	0	0.00	1617.44	0.00
80/09	1456	749	21989	0	0.00	1310.56	0.00
80/10	2241	927	25157	0	0.00	718.00	2063.25
80/11	2006	824	27927	0	0.00	667.75	1034.00
80/12	1869	802	36669	0	0.00	0.00	0.00

APPENDIX B
EXAMPLES OF MARCON COMPUTERIZED MAINTENANCE DATA

RELIABILITY STATUS REPORT

PAGE 2 OF 3 PAGES 831207

NUC: S1F00 COMPUTER, CENTRAL AIR DATA
 TYPE 1 FAILURES USHF HFB
 EQUIPMENT LEVEL 4 PROJECTED CUM MTEMA AT 500K FLTRES

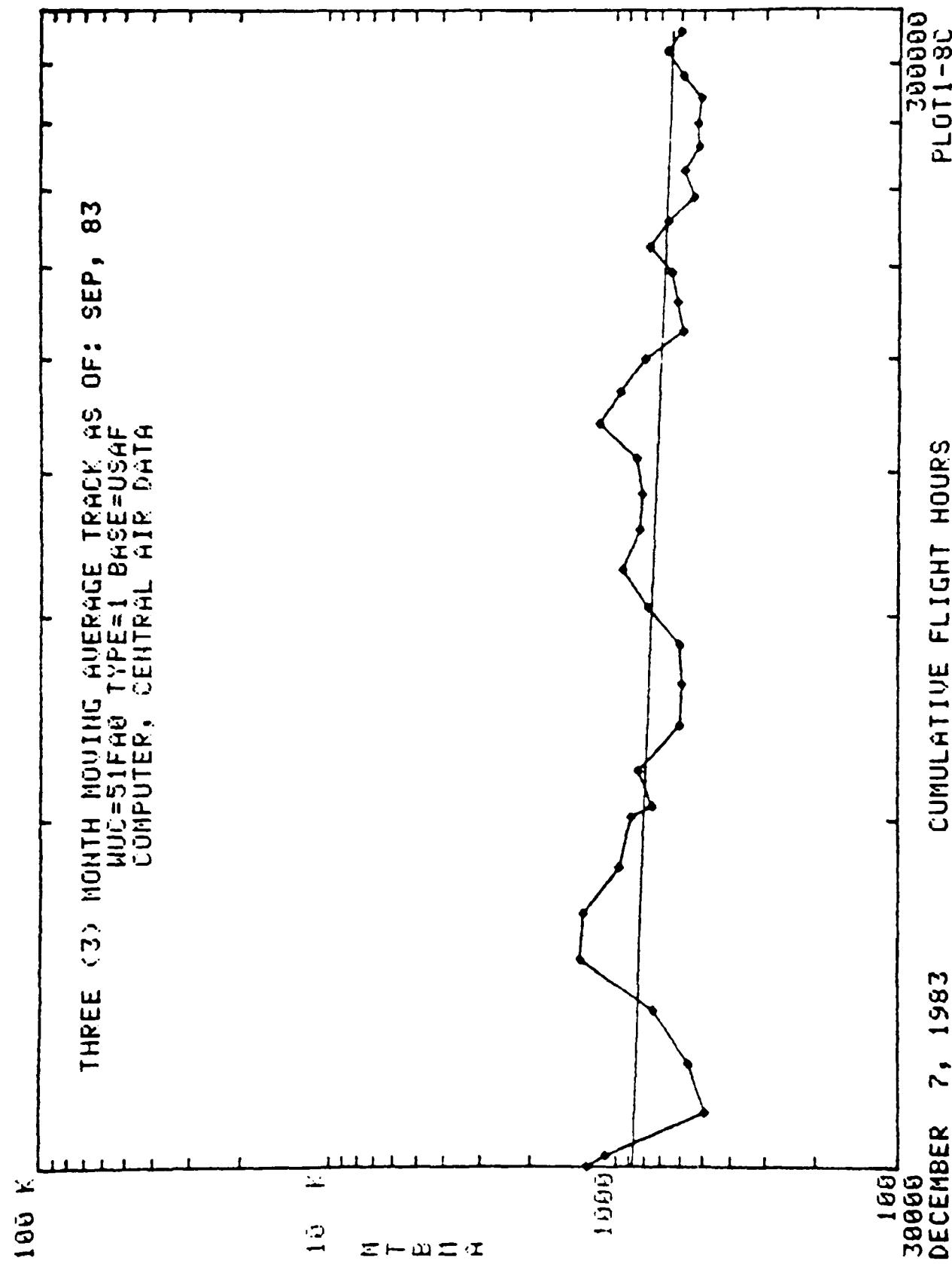
FLT HRS	FLYING HOURS	FLIGHT HOURS	CUM. FLIGHT HOURS	MONTHLY ACTUAL HOURS	3 MONTHLY ACTUAL HOURS	CUM. MTEMA	MONTHLY MTEMA	PROJ. CUM. MTEMA
1101	739	33529	36927	317.99	492.47	938.22	9.06	9.06
1102	956	41685	45435	1132.67	558.12	958.77	9.06	9.06
1103	1815	1923	1944	1087.59	744.97	912.00	9.06	9.06
1104	2214	32122	49797	1930.50	1222.99	927.24	9.06	9.06
1105	2214	32122	54535	906.33	967.86	929.57	9.06	9.06
1106	1162	1162	60242	815.29	876.85	926.82	9.06	9.06
1107	1162	1162	61630	429.23	739.73	914.21	9.06	9.06
1108	1162	1236	66259	1157.23	830.59	937.62	9.06	9.06
1109	1162	1236	67232	466.99	599.99	929.99	9.06	9.06
1110	1026	1236	68706	787.06	829.99	929.99	9.06	9.06
1111	1162	1236	69864	936.46	946.46	932.47	9.06	9.06
1112	1162	1236	70871	1027.69	989.99	932.47	9.06	9.06
1113	1162	1236	71871	951.57	769.99	916.47	9.06	9.06
1114	1162	1236	72871	1027.69	989.99	932.47	9.06	9.06
1115	1162	1236	73871	951.57	769.99	916.47	9.06	9.06
1116	1162	1236	74871	1027.69	989.99	932.47	9.06	9.06
1117	1162	1236	75871	951.57	769.99	916.47	9.06	9.06
1118	1162	1236	76871	1027.69	989.99	932.47	9.06	9.06
1119	1162	1236	77871	951.57	769.99	916.47	9.06	9.06
1120	1162	1236	78871	1027.69	989.99	932.47	9.06	9.06
1121	1162	1236	79871	951.57	769.99	916.47	9.06	9.06
1122	1162	1236	80871	1027.69	989.99	932.47	9.06	9.06
1123	1162	1236	81871	951.57	769.99	916.47	9.06	9.06
1124	1162	1236	82871	1027.69	989.99	932.47	9.06	9.06
1125	1162	1236	83871	951.57	769.99	916.47	9.06	9.06
1126	1162	1236	84871	1027.69	989.99	932.47	9.06	9.06
1127	1162	1236	85871	951.57	769.99	916.47	9.06	9.06
1128	1162	1236	86871	1027.69	989.99	932.47	9.06	9.06
1129	1162	1236	87871	951.57	769.99	916.47	9.06	9.06
1130	1162	1236	88871	1027.69	989.99	932.47	9.06	9.06
1131	1162	1236	89871	951.57	769.99	916.47	9.06	9.06
1132	1162	1236	90871	1027.69	989.99	932.47	9.06	9.06
1133	1162	1236	91871	951.57	769.99	916.47	9.06	9.06
1134	1162	1236	92871	1027.69	989.99	932.47	9.06	9.06
1135	1162	1236	93871	951.57	769.99	916.47	9.06	9.06
1136	1162	1236	94871	1027.69	989.99	932.47	9.06	9.06
1137	1162	1236	95871	951.57	769.99	916.47	9.06	9.06
1138	1162	1236	96871	1027.69	989.99	932.47	9.06	9.06
1139	1162	1236	97871	951.57	769.99	916.47	9.06	9.06
1140	1162	1236	98871	1027.69	989.99	932.47	9.06	9.06
1141	1162	1236	99871	951.57	769.99	916.47	9.06	9.06
1142	1162	1236	100871	1027.69	989.99	932.47	9.06	9.06
1143	1162	1236	101871	951.57	769.99	916.47	9.06	9.06
1144	1162	1236	102871	1027.69	989.99	932.47	9.06	9.06
1145	1162	1236	103871	951.57	769.99	916.47	9.06	9.06
1146	1162	1236	104871	1027.69	989.99	932.47	9.06	9.06
1147	1162	1236	105871	951.57	769.99	916.47	9.06	9.06
1148	1162	1236	106871	1027.69	989.99	932.47	9.06	9.06
1149	1162	1236	107871	951.57	769.99	916.47	9.06	9.06
1150	1162	1236	108871	1027.69	989.99	932.47	9.06	9.06
1151	1162	1236	109871	951.57	769.99	916.47	9.06	9.06
1152	1162	1236	110871	1027.69	989.99	932.47	9.06	9.06
1153	1162	1236	111871	951.57	769.99	916.47	9.06	9.06
1154	1162	1236	112871	1027.69	989.99	932.47	9.06	9.06
1155	1162	1236	113871	951.57	769.99	916.47	9.06	9.06
1156	1162	1236	114871	1027.69	989.99	932.47	9.06	9.06
1157	1162	1236	115871	951.57	769.99	916.47	9.06	9.06
1158	1162	1236	116871	1027.69	989.99	932.47	9.06	9.06
1159	1162	1236	117871	951.57	769.99	916.47	9.06	9.06
1160	1162	1236	118871	1027.69	989.99	932.47	9.06	9.06
1161	1162	1236	119871	951.57	769.99	916.47	9.06	9.06
1162	1162	1236	120871	1027.69	989.99	932.47	9.06	9.06
1163	1162	1236	121871	951.57	769.99	916.47	9.06	9.06
1164	1162	1236	122871	1027.69	989.99	932.47	9.06	9.06
1165	1162	1236	123871	951.57	769.99	916.47	9.06	9.06
1166	1162	1236	124871	1027.69	989.99	932.47	9.06	9.06
1167	1162	1236	125871	951.57	769.99	916.47	9.06	9.06
1168	1162	1236	126871	1027.69	989.99	932.47	9.06	9.06
1169	1162	1236	127871	951.57	769.99	916.47	9.06	9.06
1170	1162	1236	128871	1027.69	989.99	932.47	9.06	9.06
1171	1162	1236	129871	951.57	769.99	916.47	9.06	9.06
1172	1162	1236	130871	1027.69	989.99	932.47	9.06	9.06
1173	1162	1236	131871	951.57	769.99	916.47	9.06	9.06
1174	1162	1236	132871	1027.69	989.99	932.47	9.06	9.06
1175	1162	1236	133871	951.57	769.99	916.47	9.06	9.06
1176	1162	1236	134871	1027.69	989.99	932.47	9.06	9.06
1177	1162	1236	135871	951.57	769.99	916.47	9.06	9.06
1178	1162	1236	136871	1027.69	989.99	932.47	9.06	9.06
1179	1162	1236	137871	951.57	769.99	916.47	9.06	9.06
1180	1162	1236	138871	1027.69	989.99	932.47	9.06	9.06
1181	1162	1236	139871	951.57	769.99	916.47	9.06	9.06
1182	1162	1236	140871	1027.69	989.99	932.47	9.06	9.06
1183	1162	1236	141871	951.57	769.99	916.47	9.06	9.06
1184	1162	1236	142871	1027.69	989.99	932.47	9.06	9.06
1185	1162	1236	143871	951.57	769.99	916.47	9.06	9.06
1186	1162	1236	144871	1027.69	989.99	932.47	9.06	9.06
1187	1162	1236	145871	951.57	769.99	916.47	9.06	9.06
1188	1162	1236	146871	1027.69	989.99	932.47	9.06	9.06
1189	1162	1236	147871	951.57	769.99	916.47	9.06	9.06
1190	1162	1236	148871	1027.69	989.99	932.47	9.06	9.06
1191	1162	1236	149871	951.57	769.99	916.47	9.06	9.06
1192	1162	1236	150871	1027.69	989.99	932.47	9.06	9.06
1193	1162	1236	151871	951.57	769.99	916.47	9.06	9.06
1194	1162	1236	152871	1027.69	989.99	932.47	9.06	9.06
1195	1162	1236	153871	951.57	769.99	916.47	9.06	9.06
1196	1162	1236	154871	1027.69	989.99	932.47	9.06	9.06
1197	1162	1236	155871	951.57	769.99	916.47	9.06	9.06
1198	1162	1236	156871	1027.69	989.99	932.47	9.06	9.06
1199	1162	1236	157871	951.57	769.99	916.47	9.06	9.06
1200	1162	1236	158871	1027.69	989.99	932.47	9.06	9.06
1201	1162	1236	159871	951.57	769.99	916.47	9.06	9.06
1202	1162	1236	160871	1027.69	989.99	932.47	9.06	9.06
1203	1162	1236	161871	951.57	769.99	916.47	9.06	9.06
1204	1162	1236	162871	1027.69	989.99	932.47	9.06	9.06
1205	1162	1236	163871	951.57	769.99	916.47	9.06	9.06
1206	1162	1236	164871	1027.69	989.99	932.47	9.06	9.06
1207	1162	1236	165871	951.57	769.99	916.47	9.06	9.06
1208	1162	1236	166871	1027.69	989.99	932.47	9.06	9.06
1209	1162	1236	167871	951.57	769.99	916.47	9.06	9.06
1210	1162	1236	168871	1027.69	989.99	932.47	9.06	9.06
1211	1162	1236	169871	951.57	769.99	916.47	9.06	9.06
1212	1162	1236	170871	1027.69	989.99	932.47	9.06	9.06
1213	1162	1236	171871	951.57	769.99	916.47	9.06	9.06
1214	1162	1236	172871	1027.69	989.99	932.47	9.06	9.06
1215	1162	1236	173871	951.57	769.99	916.47	9.06	9.06
1216	1162							

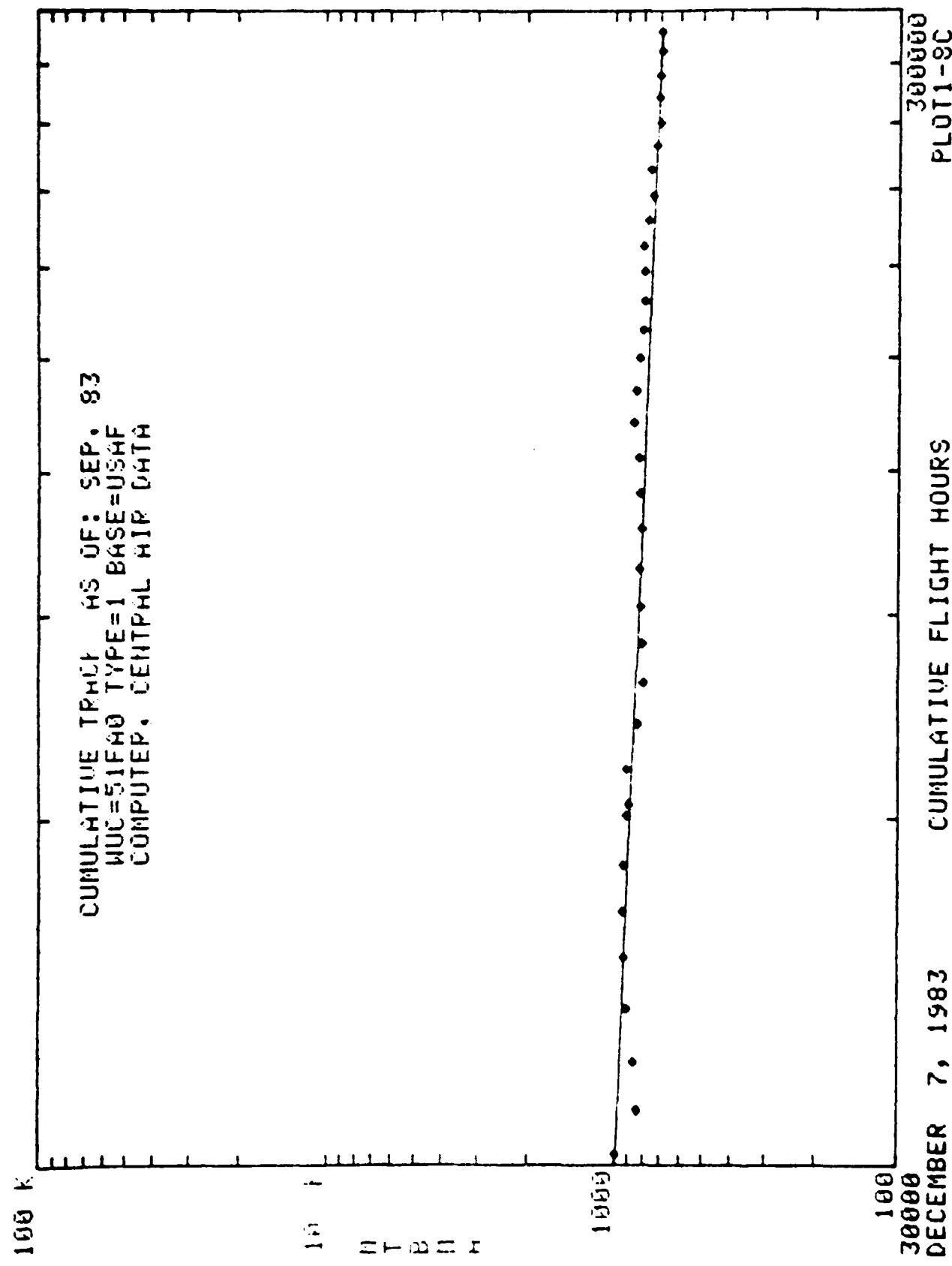
RELIABILITY STATUS REPORT

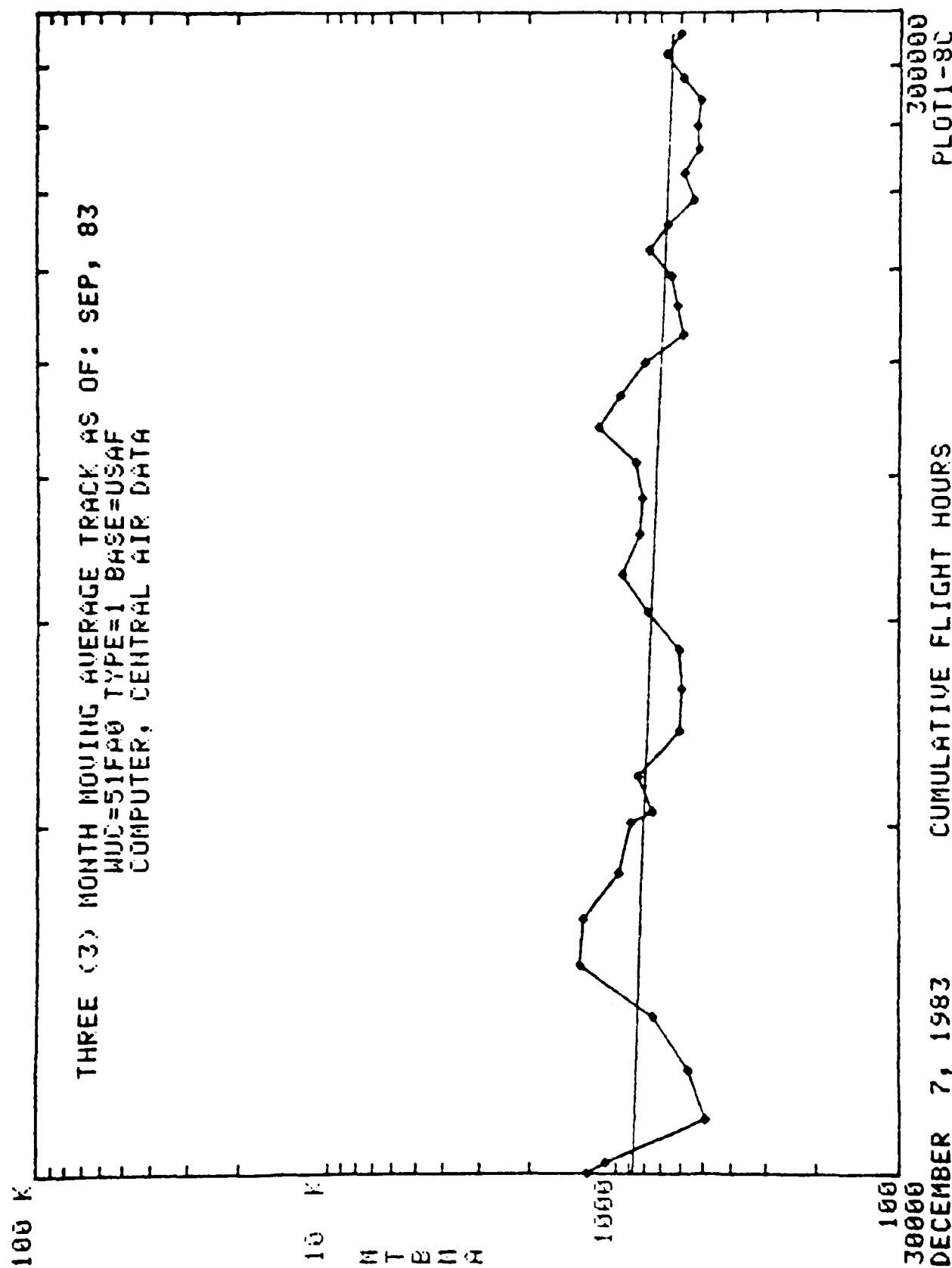
PAGE 3 OF 3 PAGES 831207

WUC: 51FA0 COMPUTER, CENTRAL AIR DATA
 TYPE 1 FAILURES USAF AFB
 EQUIPMENT LEVEL 4 PROJECTED CUM MTBMA AT 500K FLTHRS

DATE	ACTUAL FLYING HOURS A	CUM. FLIGHT HOURS B	MONTHLY		3 MONTH AVERAGE		ACTUAL CUM. MTBMA		PROJ. CUM. MTBMA
			FAIL	ACTUAL MTBMA	FAIL	ACTUAL MTBMA	FAIL	ACTUAL MTBMA	
83/01	8243	1474	197602	20	435.85	663.02	771.88	9.00	
83/02	8592	1306	207508	24	412.42	526.39	741.07	0.00	
83/03	9411	1754	218665	9	1240.56	530.75	756.63	0.00	
83/04	9134	1546	229345	28	381.43	520.39	723.49	0.00	
83/05	9729	1536	240610	26	433.27	525.56	701.49	0.00	
83/06	16549	1635	252794	13	937.23	509.39	719.19	0.00	
83/07	16165	1500	264459	21	555.43	595.23	701.49	0.00	
83/08	11075	1977	277511	21	621.52	670.93	697.25	0.00	
83/09	8888	1508	287907	17	611.53	595.14	693.75	0.00	
TOTAL	231227	56689		415					







APPENDIX C
EXAMPLES OF TASC COMPUTERIZED MAINTENANCE DATA

1 FEB 83 TO 30 APR 83
 GRIFFISS MIROT
 OAS FUNCTIONAL SYSTEM

FILE #1 OAS HUC RANKING REPORT FOR TYPE 1 ACTIONS

LIST	HUC	ACTIONS	PERCENT	EQUIPMENT NAME	COMMENTS
1	73CG	103	16.4	**RADAR SET INSTALLATION (CONT.)	RETAINED EQUIP.
2	73KA	50	8.0	**CONTROL UNIT AVIONICS	EQUP.
3	73RB	47	7.5	**RECEIVER-TRANSMITTER-HOLDER	EQUP.
4	73LK	35	5.6	**CONTROL RADAR SET RMMP	EQUP.
5	73CF	33	5.3	**RADAR SET INSTALLATION	RETAINED EQUIP.
6	73FA	30	4.8	**ANTENNA, RADAR OAS MOD (16)	EQUP.
7	73LE	20	3.2	**RECODER VIDEO	EQUP.
8	73PA	20	3.2	**INERTIAL MEASUREMENT UNIT (IMU)	GEAR
9	73CP	18	2.9	**ANGLE OF ATTACK INSTALLATION	RETAINED EQUIP.
10	73LB	18	2.9	**IND. MULTI DISPLAY (MDP)	EQUP.

NOTES:

(1) ONLY YY CHANGE TO RADAR ANTENNA IS FERRITE SWITCH WHICH IS NOT FAILING

APPENDIX C
EXAMPLES OF TASC COMPUTERIZED MAINTENANCE DATA

1 FEB 83 10 30 APR 83

GRIEFFISS MINOT

OAS = YY CONTRACTUAL SYSTEM

0010 AS OF : 03/04/30

DATE: 03/06/13 19:20 EST

1018

- (1) CONTROL DISPLAY INTERFACE UNIT.
- (2) ARMAMENT INTERFACE UNIT.
- (3) RADAR INTERFACE UNIT.
- (4) ONLY YY PART IN ANTENNA IS FERRITE SWITCH

1 FLB E5 TO 30 MAR 85
GRIFFISS MINOR
OAS FUNCTIONAL SYSTEM

RUN: 83/01.13 21:54 EST

DATA AS OF: 83/04/30

FIRST OAS HUC MAINTENANCE MAN-HOURS RANKING FOR ALL ACTIONS

TOTAL HAN-HOURS: 13230.2 FROM: 83/02/01 TO: 83/04/30

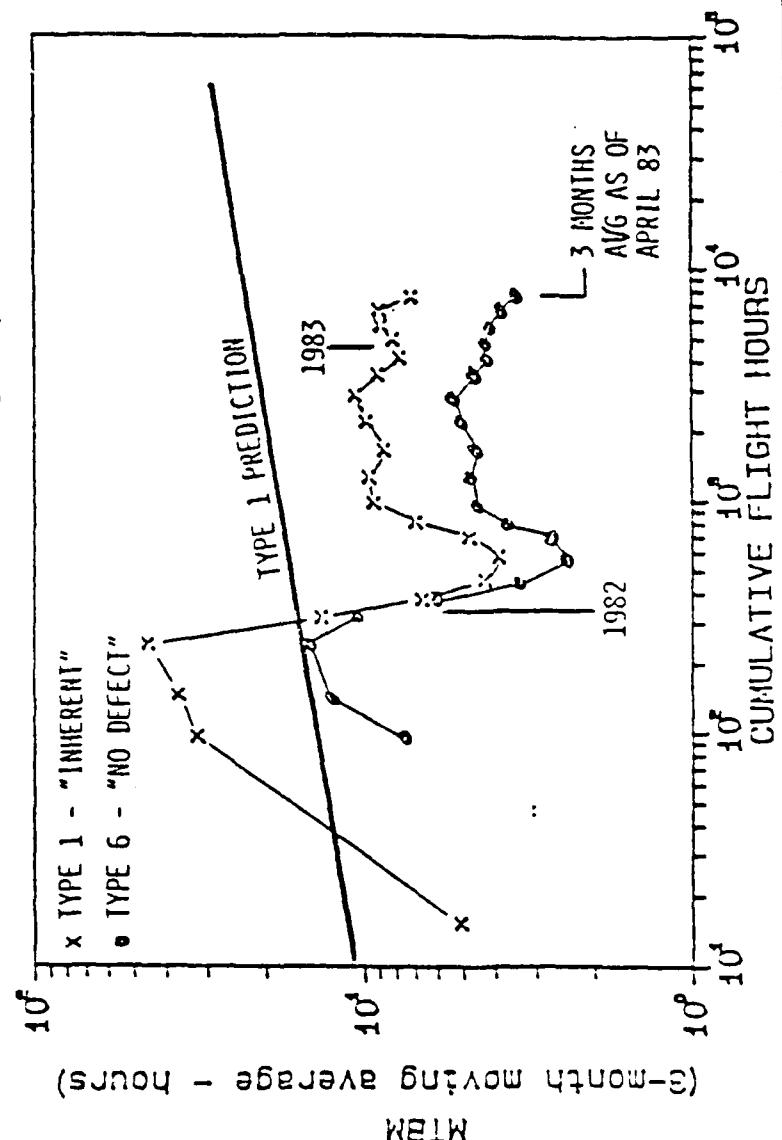
LIST	HUC	HAN HOURS	PERCENT	EQUIPMENT NAME	COMMENTS
1	73CG	1825.0	13.8	**RADAR SET INSTALLATION (COM)	RETAINED EQUIP.
2	73RB	1470.8	11.1	**RECEIVER-TRANSMITTER-MODULATOR	RETAINED EQUIP.
3	72K0	1170.8	8.8	**RADAR SET GROUP	RETAINED EQUIP.
4	73KA	1052.2	8.0	**CONTROL UNIT (WVUNITS)	RETAINED EQUIP.
5	73PC	939.0	7.1	**INS ROTOR SUPPORT BATTERY AS	GRAE
6	73HA	506.1	3.8	**INERTIAL MEASUREMENT UNIT IMU	RETAINED EQUIP.
7	73RA	451.7	3.4	**ANTENNA, RADAR OAS MODIFIED	RETAINED EQUIP.
8	73HA	305.3	2.3	**DOPPLER VELOCITY SENSOR	RETAINED EQUIP.
9	73PC	10.9	0.1	**INS ROTOR SUPPORT BATTERY AS	GRAE
10	73PC	0.0	0.0	**INS ROTOR SUPPORT BATTERY AS	GRAE

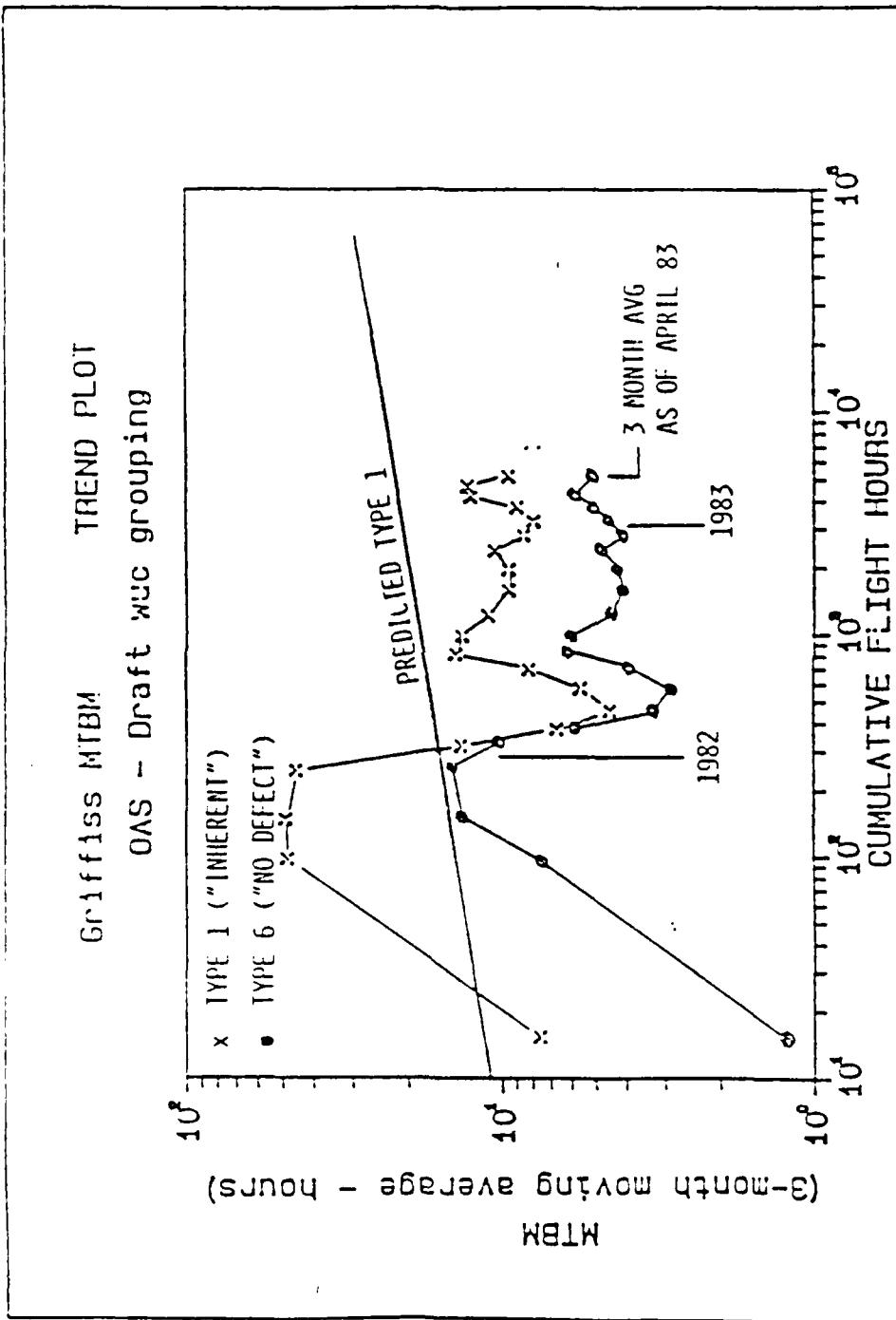
NOTE

(1) ONLY YY PART IN ANTENNA IS FERRITE SWITCH.

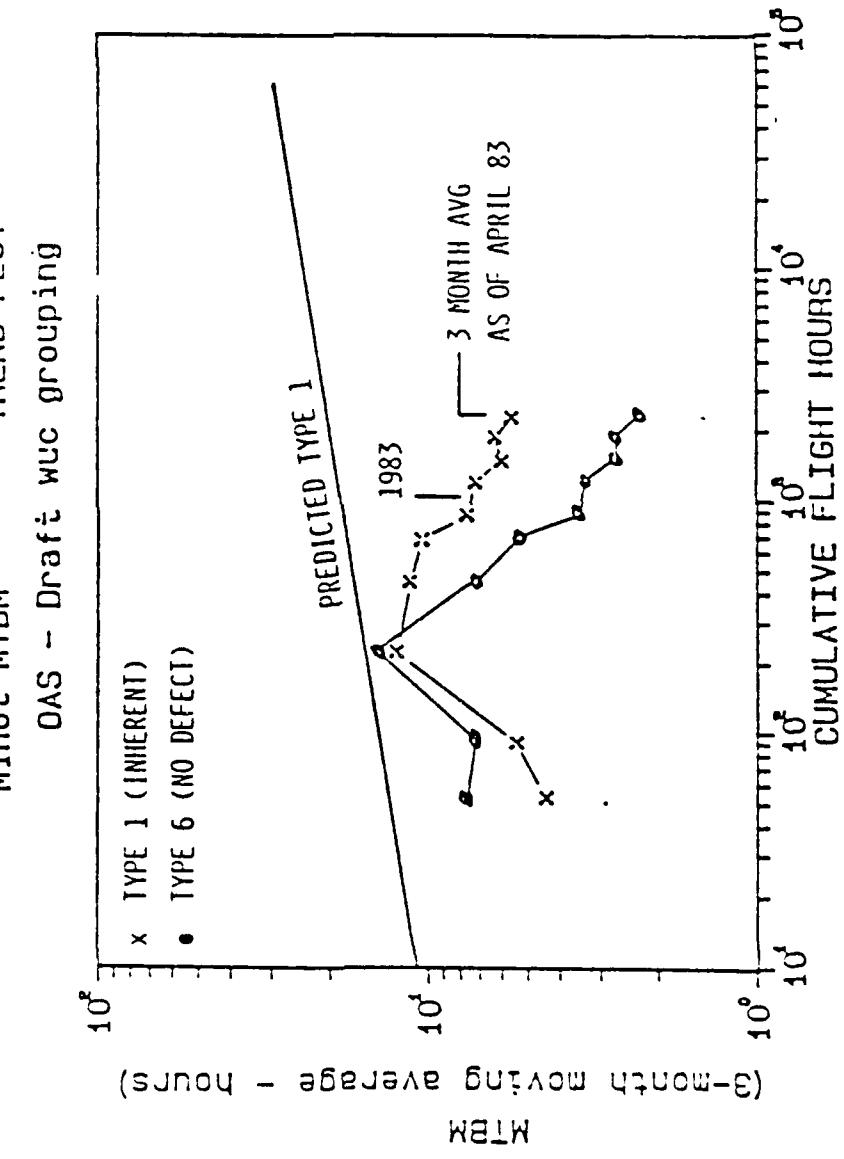
BASES: GRIFFISS MINOI

Fleet MTBM TREND PLOT
OAS - Draft muc grouping

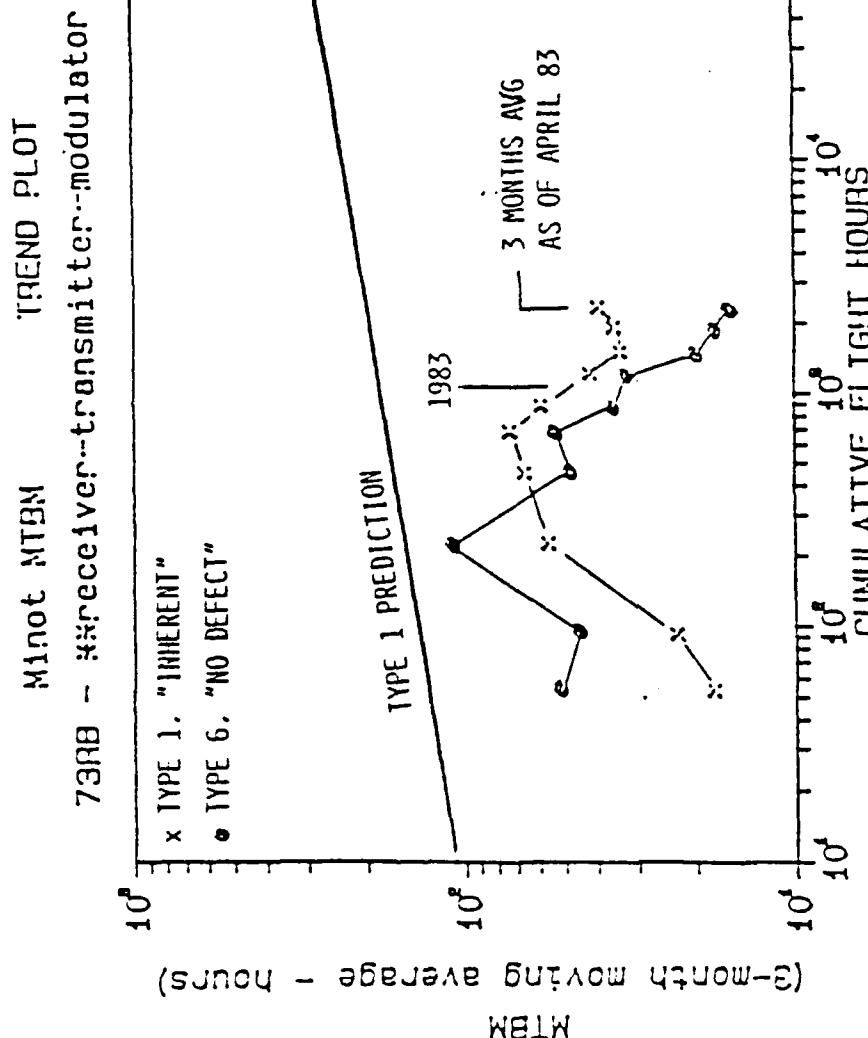




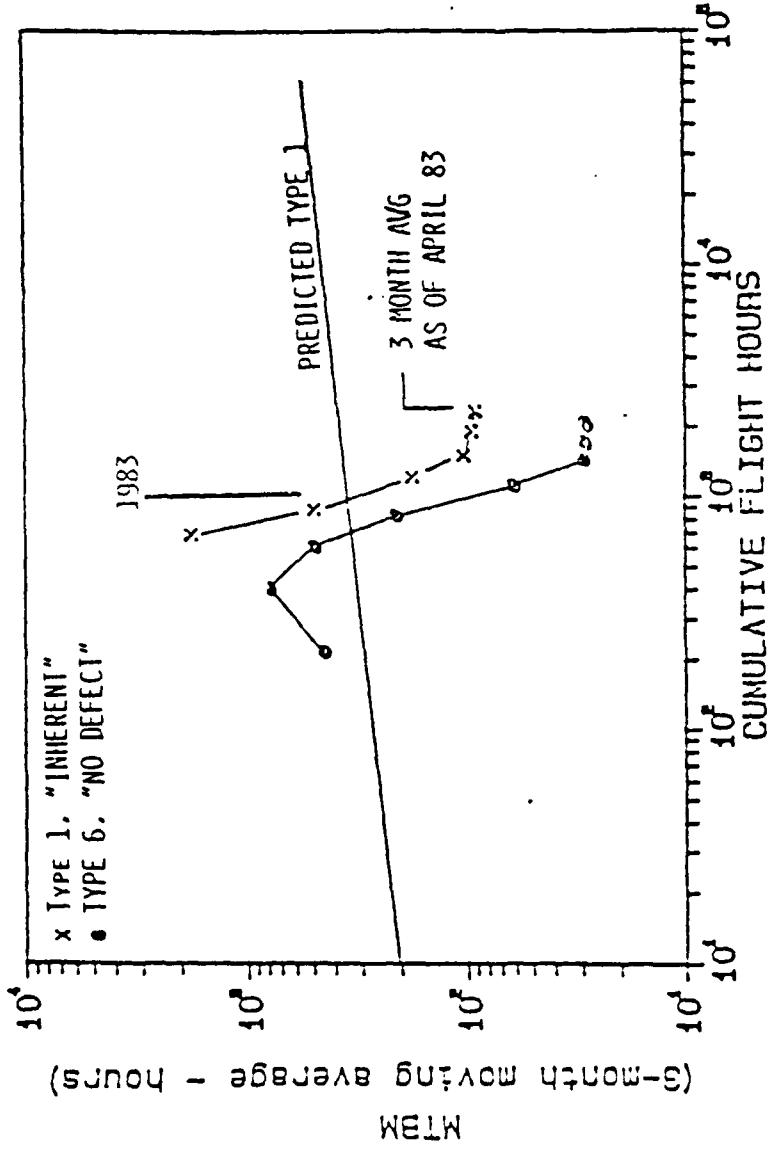
Minot MTBM
TREND PLOT
OAS - Draft WUC grouping



MINOT MTBM
73RB - receiver-transmitter-modulator



Minot MTBM TREND PLOT
73KA - *control unit avionics (QPA=3)



SELECTED BIBLIOGRAPHY

A. REFERENCES CITED

1. Anderson, Jeff. Engineer, F-16 Systems Program Office, HQ AFSC, ASD/YPE, Wright-Patterson AFB OH. Personal interview. 16 December 1983.
2. Badalamente, Major Richard V., USAF, and Major Thomas D. Clark, USAF. "Spinning Our (Information) Wheels: A Look at the Maintenance Data Collection System." Unpublished technical report, LSTR 1-78, AFIT/LSGR, Wright-Patterson AFB OH, February 1978.
3. Betert, Wally. Chief Reliability & Maintainability Branch, ASD/ENSSR, Wright-Patterson AFB OH. Personal interviews conducted intermittently from June 1983 to December 1983.
4. Hartley, Major Harold G., USAF, and Captain Richard V. Jamieson, USAF, "An Evaluation of the Use of the Maintenance Data Collection System by the Major Operational Command Level." Unpublished master's thesis. SLSR 13-67, AFIT/SL, Wright-Patterson AFB OH, August 1967.
5. Hussain, Donna, and K. M. Hussain. Information Processing Systems for Management. Homeward IL: Richard D. Irwin, Inc., 1981.
6. Hermes, Phil, Reliability/Maintainability Engineer, Strategic Systems Program Office, ASD/YYEE, Wright-Patterson AFB OH.
7. Hiler, Jerry, F-16 Reliability and Maintainability Production, Evaluation and Tracking System, MARCON Industries, Dayton OH. Personal interview, 23 June 1983.
8. Hoffman, Captain Irving L., USAF, and Captain Robert L. Wardrip, USAF, "Criteria and Data for a Reliability and Maintainability Information System." Unpublished master's thesis. SLSR 8-71A, AFIT/SL, Wright-Patterson AFB OH, February 1971.
9. The Analytic Sciences Corporation (TASC), Reliability Assessment Capabilities Using the OAS/ALCM Field Data Tracking System, Volume I. TR-3406-2-1, Rending MA, 14 January 1983.

10. U. S. Department of the Air Force, Air Force Logistics Command. "Maintenance and Operational Data Access System (MODAS)," AFLC/LOLC Briefing, Wright-Patterson AFB OH, 1983.
11. . Product Performance, AFLCR 66-15. Wright-Patterson AFB OH, 2 July 1980.
12. U. S. Department of the Air Force. Aerospace Vehicle and Equipment Inventory, Status and Utilization Reporting System (AVISURS). AFR 65-110. Washington: Government Printing Office, 1 April 1980.
13. . Air Force Systems Command. Joint Agreement on Increased R&D for Readiness and Support, Andrews AFB Washington DC, 22 June 1983.
14. . Air Force Reliability and Maintainability Program. AFR 800-18. Washington: Government Printing Office, 15 June 1982.
15. . Maintenance Data Collection System (MDC). AFM 66-267. Washington: Government Printing Office, 1 October 1979.
16. . Product Improvement Policy (PIP) for Operational Equipment. AFR 66-33. Washington: Government Printing Office, 8 February 1982.

B. RELATED SOURCES

U. S. Department of the Air Force. Air Force Acquisition Logistics Division, Aircraft Historical Reliability and Maintainability Data. AFALDP 800-4 Wright-Patterson AFB OH.

. Maintenance Management Policy. AFR 66-1. Washington: Government Printing Office, 21 April 1983.

AUTHOR BIOGRAPHICAL SKETCH

Larry K. Bock was born on 20 March 1950 in Clarksville, Arkansas. He graduated from high school in Clarksville in 1968 and attended the College of the Ozarks there, graduating in May 1972 and receiving the degree of Bachelor of Science in Mathematics. Upon graduation, he enlisted his commission in December 1972. He completed navigator training a year later at Mather AFB in Sacramento, California. He served as a C-130 navigator at Dyess AFB in Abilene, Texas and at Rhein-Main, Germany, followed by a tour in Headquarters, USAFE at Ramstein AB. He entered the school of Systems and Logistics of the Air Force Institute of Technology Air University in June 1982.

Permanent Address: 115 Popular
Clarksville, Arkansas 72830